The Reader Writes:—

As to Titles

In May, 1938, issue of CHEMICAL INDUSTRIES, on Page 564 under heading "News of the Specialties," you have an item to the effect that "Frank E. Wilson, former sales manager of James Good, Inc., Philadelphia, has resigned. . . . ."

Frank E. Wilson *never* was sales manager of this company.

Philadelphia, Pa. H. GOODMAN
James Good, Inc.

Wants More Help

I like the page in your picture section illustrating "First Aid to Depressed Sales." Both the ideas of group meetings of consumers, as embodied in the Bakelite Travelcade, and the travelling laboratory of the Davison Chemical Company, can be used in many fields and by different companies. Give us more of this kind of material which will help us when we need so badly to get any help that we can in selling work. Despite the Government's best efforts in that direction, I do not believe that the U. S. A. is going to the everlasting bow-wows, and I am still thinking that we can go out and create business for chemicals, even in spite of everything.

Los Angeles, Calif. LESLIE N. MORRISON

"The Real Chemical Business Magazine"

All sections of your magazine are not equally useful to me, but it serves its purpose well. It is indeed the real "chemical business magazine."

Martinez, Calif. EARL B. MARTINSEN

Straight Like a Pretzel

Your editorial "Reichsforschungsrat" in the May issue is priceless. You have selected a timely and perfect example of how to any good Nazi, the end justifies any means and how straight thinking can be twisted into a pretzel.

But you missed one point. Just exactly the same methods and the same thinking controls in Russia. You ought to have made that plain too.

Keep up the fight for the integrity of scientific thinking and for individual liberty, mental as well as physical.

Dover, N. H. JOHN HAZEN BOOTH

A Pressure Group for Chemistry

The United States is deluged with propaganda and I have real hesitancy in suggesting anything that will add to this rising tide of inspired literature. Nevertheless, if science and industry are not to be drowned out in this flood of self-interested educational (sic) material, something must be done about it by chemists and chemical manufacturers.

We have twice recently seen the power of personal letters, and on behalf of chemistry, I would like to put that power into motion for the good of every one of us. This is not only a matter of self defense, but if we sincerely believe that the practical applications of chemical science through the medium of the chemical industry are creating a safer and more abundant life, we can in defending ourselves advance the best interest of the entire nation.

You must recall the now classic misrepresentation of the TVA authorities that "the humble legume can produce nitrogen cheaper and more efficiently than any chemical plant." The pacifists exaggerate absurdly the effectiveness of poison gas. The technocrats call for the moratorium on research. It is all but impossible to pick up a copy of any daily newspaper today and not find in it misstatements that affect chemistry and the chemical industry.

Whenever such misstatements appear, hundreds of chemists should write to the newspapers publishing them and to the persons making such statements correcting them vigorously. Let us start a chain letter to stop chemical misrepresentations.

Detroit, Mich. H. MANN GARDINER

Would Sue Congress

If Congress for the sixth consecutive year turns over the control of vast expenditures to the executive branch of the Government, why should not a group of taxpayers band together and sue for malfeasance all the Senators and Representatives who voted for this measure? Such a vote is criminal neglect of their elected duties.

Maybe this sounds fantastic to you, but placing vast sums of money in the hands of the President is plainly contrary to the intent of the Constitution which provides specifically that "the power of the purse" shall rest in the hands of the people's elected representatives.

I have seen in the daily press suggestions that income taxpayers who sincerely and thoroughly disapprove of the way their money is being spent, should go on a sit-down strike. It seems to me, however, that more effective than this would be legal action for neglect of duty against members of Congress.

Boston, Mass. T. CABOT SHERMAN

Trade Treaties Again

Howell Cook made a point in his letter published in your May issue which is perfectly clear, but which I also suspect would be extremely difficult to prove. Still, this suggestion ought to be carried out and it would be most interesting and also most valuable if we could estimate pretty accurately the amount of chemicals which are being brought into the United States in all sorts of manufactured and process goods, the duty upon which have been materially lowered by the Hull Trade Treaties.

It appears that Secretary Hull is perfectly sincere and honestly believes that he is furthering the cause of international peace; but good intentions are an inadequate excuse for his short-sighted and misguided policies. His colleagues in the Administration are continually preaching that we are living in a New Era. Cannot some of them convince him that what he is trying to do is simply playing into the hands of those strong, aggressive, self-centered nations which are today taking full opportunity of the present tide in current world affairs to make themselves strong and self supporting. It is doubtful whether this tide can be turned. The small nations seem doomed. Only big strong, self-contained national units are going to survive in the future.

Unless one is a rank sentimentalist, he must face these facts squarely, and what the Government in this country should do is not to play directly into the hands of the totalitarian states in this way, but aggressively and constructively to make every possible effort to build up a self-contained United States of America. This is not jingoism, but plain common sense. If we do not awake to reality now, we shall have it most unpleasantly thrust down our throats tomorrow.

New York City P. N. OLSON

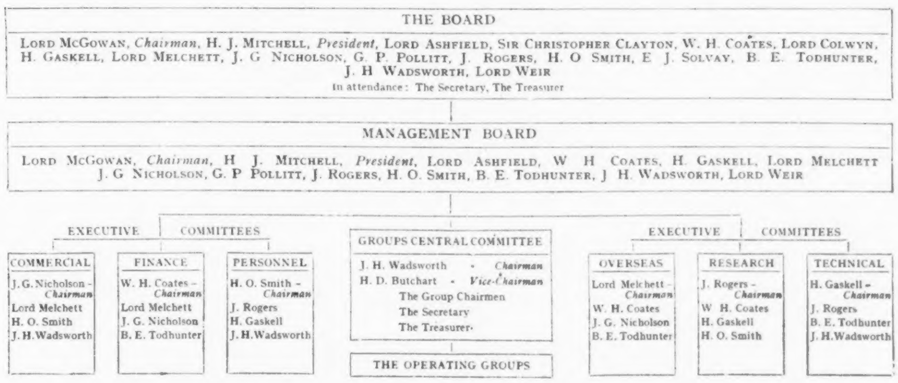
CHEMICAL INDUSTRIES

The Chemical Business Magazine

Time to Reorganize

MOST of the good, old, copybook maxims have been lightly tossed into the wastebasket; but one at least—"In time of peace, prepare for war"—seems still to be universally respected. And the strictly industrial applications of this time-tested rule-of-conduct are being put into effect in many chemical companies who are taking the opportunity of slack business to overhaul plants, programs, and policies. From catalogs and safety regulations to major operations and financial structures we hear of all kinds of revision projects.

One of the most far-reaching and interesting of these is the reorganization of the executive staff of Imperial Chemical Industries announced quite briefly by Lord McGowan at the recent annual meeting. Essentially, it embodies a rather drastic decentralization of authority by taking from the corporation's executive head "the task of everyday decisions on current business," and entrusting them to seven Executive Directors, each heading several sections of administration; namely, commercial, financial, overseas, personnel, research, technical, and operating. The plan is charted:



There are styles in management as in clothes and sports. This scheme of administration appears to be a return to the form of "committee management" made famous by the original Standard Oil Company and most familiar in chemical industry through the organization of the old Grasselli Chemical Company. The American trend has been towards the more centralized staff control, but this new set-up of the I. C. I. is an abrupt departure from the more concentrated authority usual in British corporations. It suggests rather pointedly, that during this slack summer period before us a very thoughtful study of company administration might be a highly profitable occupation.

Williams Haynes, Publisher and Editor; A. M. Corbet, and W. J. Murphy, Associate Editors; W. F. George, Advertising Manager; D. O. Haynes, Subscription Manager; J. H. Burt, Production Manager.

Speculations Upon Mercury

A host of rumors have followed the sharp rise in mercury prices. One of the most engaging concerns the recent considerable purchases by Pacific Coast banks. Sinister Japanese designs have been hinted at, though why any foreign buyers should pay the American tariff of $19.15 a flask does not seem to be very clearly explained away. It has been suggested that the Cartel has been cleaning up American stocks with the idea that, this being the world's best market, a better statistical position here would be necessary to justify the price advance. This is an old tale often retold, for it is very human to blame the Cartel whenever the mercury market moves either up or down. But after all, is not the most likely explanation that some metal-minded speculators, and there are plenty of them in our western states, have been picking up mercury through the banks as a hedge against an inflation? Possibly a wee bit of advance information, or more likely a shrewd bit of market forecasting, may have influenced them. However, mercury, in form, in bulk, in value and in breadth of market, is so obviously a desirable commodity for capital conservation purposes that all these explanations seem a little tortuous.

Phosphate Barrage

May twentieth the President sent his long delayed phosphate message to Congress, and Secretary of Agriculture Wallace delivered a radio address on "Conservation of Phosphorus—A Material Problem." Both definitely and deliberately created the general impression that the present phosphate situation is serious and inimical to the best interests of the American people. Their logic leads straight to the conclusion that the Federal Government ought to do something about it.

But here are a few well attested facts to consider before we accept that conclusion:

1. U.S. phosphate reserves (known high-grade rock only) are 6,515,000,000 long tons—sufficient for 2,000 years.

2. The ratio of our phosphate exports has been diminishing—not increasing—from 951,305 tons in 1931 to 1,179,138 in 1937 against exports from all other producing areas of 3,808,040 in 1931 to 6,320,310 in 1937.

3. Concentrated superphosphate has been made in the U.S. for 31 years. Present facilities in seven plants are over 213,000 tons which (omitting 46,000 tons distributed free by T.V.A.) is over double the consumption so that this capacity need not be increased until there is over 100 per cent. growth in demand for this familiar high-test material.

4. Total fertilizer consumption in the Intermountain States is only 25,617 tons of all types of materials out of a national consumption of over 8,000,000 tons.

5. Freight rates from Intermountain points where proposed new superphosphate plants might be built to our main fertilizer consumption areas equal per ton the costs of all raw materials.

Chemicals in Russia

All does not go well with the chemical portions of the current Russian five-year plan. People's Commissar for Heavy Industries Kaganovich in one breath boasts that Germany's chemical production will shortly be outstripped and in the next fulminates against the dreadful spying and sabotage that hamper the Soviet chemical operations. There have been some notable casualties among prominent chemical executives, and quite definite word has reached England, and drawn the editorial comment of *The Industrial Chemist,* that coal-tar dye production last year fell woefully short of the projected 32,500 metric tons. Furthermore, a number of dyes produced in the 1934-36 period have been abandoned as unsatisfactory in application or too difficult or costly in production.

In the face of these chemical setbacks it is cheerfully proposed practically to double the dye output within the next five years. The great accomplishments of the new electro-chemical process for benzidine and the high-pressure process for para-nitraniline are well publicized, and Commissar Kaganovich promises to exceed German technical and industrial records—within the next five years. Always, it would seem, Russia is to triumph—within the next five years.

Safety in Ohio Plants

For the past decade there has been but little change in the relative order of the six most common causes of industrial injury claims in Ohio; and contrary to popular guess, accidents from "hot, corrosive, and poisonous substances" stand sixth—not first—on this list. Of the 201,095 injury claims filed in that State in 1937, only 12,792 (roughly one in fifteen) arose from these strictly chemical causes. In these 12,792 chemical accident claims there were but 42 fatalities. Labor and the general public both cherish the erroneous belief that occupation in a chemical plant is notably hazardous. That the facts do not confirm this is plain.

Successive Fifty Per Cent. Tariff Reductions

Confusion arising out of various interpretations of the power of the State Department to reduce existing tariffs by reciprocity treaties is cleared up by the following exchange of correspondence between W. N. Watson, Secretary, Manufacturing Chemists' Association, and Harry C. Hawkins, Chief, Division of Trade Agreements, Department of State.

To the State Department:

Enclosed herewith is an editorial from CHEMICAL INDUSTRIES of April, 1938, concerning the Trade Agreements Act and referring in the third paragraph to an interpretation by the Attorney General to the Secretary of State to the effect that authority exists for successive 50% reductions under each trade agreement, which amounts to progressive rate cutting. On account of the importance of the conclusion referred to in the editorial to the chemical industry, I am writing to ask your opinion on this and related questions concerning the trade agreement program.

The supplement to the list of products on which the United States will consider granting concessions to the United Kingdom, Newfoundland, and the British Colonial Empire dated January 24, 1938 carried the following on page 1, paragraph 3:

> "No further reduction will, of course, be made in any import duty which has already been reduced by 50 per cent. under the authority of the Trade Agreements Act."

Is it correct to interpret the above quotation as a declaration of policy to limit, under the Trade Agreements Act, a reduction of a rate to 50% from either a single or under successive agreements?

Does authority exist, under the Trade Agreements Act, to make successive reductions under that Act which exceed 50%?

Is it correct that authority exists under Section 336 and under the Trade Agreements Act (Public No. 316) to make a 50% reduction under Section 336 and subsequently to make another 50% reduction of the remaining rate under the Trade Agreements Act?

The enclosed editorial refers specifically to an interpretation by the Attorney General on the powers under the Trade Agreements Act to make successive 50% reductions in an existing rate. The reference in the editorial under discussion would indicate that there has been an opinion by the Attorney General as to the legal authority under the Trade Agreements Act. The editorial also suggests that this legal authority may differ quite considerably from the declaration of policy by the State Department on this very point. To clarify this, is it a fact that the declared policy of the State Department is a voluntary limitation on their part of the legal authority which the Attorney General says they possess under the act?

April 20, 1938 WARREN N. WATSON, Secretary,
Manufacturing Chemists' Association

To the Manufacturing Chemists' Association:

The receipt is acknowledged of your letter of April 20, 1938, addressed to Mr. Woodard, enclosing an editorial entitled "Two Tariff Tricks" and requesting information with respect thereto.

The editorial in question criticizes the policy of generalizing trade-agreement concessions and also refers to an "interpretation" supposed to have been made by the Attorney General regarding the Trade Agreements Act to the effect that the authority exists under that Act to make successive 50% duty reductions in trade agreements.

With respect to the first point, I may say that certain misconceptions appear to exist regarding our policy of generalizing trade-agreement concessions to countries which do not discriminate against American trade. In general, the tariff concessions granted in any trade agreement relate only to products or types of products of which the country in question is the principal or an important source of our total imports of such products. These concessions generally are of secondary or minor interest to other foreign countries. Nevertheless, the probable effects of the generalization of concessions to other countries are not overlooked in the course of the thorough studies concerning possible concessions in a trade agreement. In this connection, there is enclosed for your information a memorandum explaining some of the reasons for, and advantages of, our policy in this regard.

With respect to the second point, the editorial states:

> "Under the law no reciprocal trade agreement may lower any tariff rate by more than 50 per cent., and it has been generally assumed that the base would be the Tariff of 1930. But by interpreting the law to mean that this 50 per cent. reduction may be made from the tariff rate actually in effect when each new trade treaty becomes effective, the Attorney General has put into the hands of the Secretary of State the power of successive one-half rate reductions that at the second step mean a 75 per cent. reduction from 1930 rates, and at the third step 87½ per cent., or one-eighth of the original rate."

In the Department's opinion, the President is authorized to reduce an import duty under the provisions of the Trade Agreements Act by no more than 50%. In other words, once an import duty has been reduced by the full 50% permitted under the Trade Agreements Act, no further reduction may legally be made in the rate of duty pursuant to trade agreements. This limitation upon the authority conferred by the Trade Agreements Act has seemed so clear and unequivocal to the Department that it has not appeared necessary to refer the matter to the Attorney General for an opinion. In this connection, and in view of the statement in the editorial and the question in your letter regarding an opinion of the Attorney General, I may say that this Department has on several occasions conferred with the office of the Attorney General concerning matters involved in the negotiation of trade agreements and concerning litigation arising out of agreements. There has been no opinion rendered by that official, so far as I am aware, which is in conflict with this Department's views as expressed above.

The question of the authority to make successive 50 per cent. reductions in trade agreements appears to have been raised after the publication on January 8, 1938 of a list of products in connection with the notice of trade-agreement negotiations with the Government of the United Kingdom. In view of the fact that question was raised on this point at that time, there was included in the announcement of the supplementary list of January 24 the statement cited in your letter that "No further reduction will, of course, be made in any import duty which has already been reduced by 50% under the authority of the Trade Agreements Act."

With respect to your further question regarding the authority to make a reduction under the Trade Agreements Act in a rate of duty previously reduced under Section 336 of the Tariff Act, the Department is of the opinion that such authority does exist. I may point out that there have been only a few instances where the rate on an article has been reduced under Section 336 and subsequently further reduced in connection with a trade agreement.

For the Secretary of State,
HARRY C. HAWKINS,
May 5, 1938 Chief, Division of Trade Agreements

Industrial Aspects of Baking Powder

By Simon Mendelsohn

THE actual preparation of this commodity involves no intricate technology. All consecutive operations are essentially continuous, involving only the weighing, sifting, and mixing of "raw" materials, and subsequent conveying and packaging of finished product. At a stage following the mixing process, and preceding the conveying of the powder to packing units, samples of the tentative mixture are withdrawn for analytical control and baking tests. Raw materials entering into the composition are of exceptionally high grade, but nevertheless are rechecked to verify their purity and conformity with accepted criteria, prior to use.

A baking powder represents an aggregation of the individual attributes of its constituents, which if properly selected and compounded according to specifications, should yield a food adjunct characterized by stability, efficiency, and economy. The domestic expediency and purposes of chemical leavening mixtures are so well known as to justify no further elaboration. Baking powders are subject to specific mandatory requirements imposed by Federal and State food legislation whereby pure and efficient preparations are assured to the consumer.

According to the United States Definition and Standard,[1,2] baking powder is the leavening agent produced by the mixing of an acid reacting material and sodium bicarbonate, with or without starch or flour, and yields not less than twelve per cent. (12%) of available carbon dioxide. Acid reacting materials specified are, (1) tartaric acid or its acid salts, (2) acid salts of phosphoric acid, (3) compounds of aluminum, or (4) any combination in substantial proportions of these. Principles of standardization are applicable in this instance to the effect that the definitions be so interpreted as to exclude from articles specified, any substances not included in the descriptive text of the food laws. Any innocuous substance, not within this definition as stated, may be used in baking powders providing the presence of such addition or substituent is conspicuously declared upon the label.

United States Government specifications stipulate the following requirements for five types of baking powder purchased on Federal requisitions.[3]

Chart No. 1

Leavening Reactions

In general; $NaHCO_3$ + Acid Reactants ⟶ Leavening Gas (CO_2) + Reaction Residues

	Type of Baking Powder	Acid Reactant	Transformations										
1	Tartaric Acid	Tartaric Acid*	$2\ NaHCO_3$ Sodium bicarbonate	+	$H_2C_4H_4O_6$ Tartaric Acid	⟶	$2\ CO_2$ Carbon dioxide	+	$Na_2C_4H_4O_6$ Sodium tartrate	+	$2\ H_2O$ Water		
2	Cream of Tartar ("Tartrate")	Acid potassium tartrate (potassium bitartrate)	$NaHCO_3$ Sodium bicarbonate	+	$KHC_4H_4O_6$ Acid potassium tartrate	⟶	CO_2 Carbon dioxide	+	$KNaC_4H_4O_6$ Potassium-sodium tartrate*†	+	H_2O Water		
3	"S. A. S."	Sodium Aluminum Sulphate†	$8\ NaHCO_3$ Sodium bicarbonate	+	$Na_2SO_4 . Al_2(SO_4)_3$ Sodium aluminum sulphate	⟶	$6\ CO_2$ Carbon dioxide	+	$4\ Na_2SO_4$ Sodium sulphate‡	+	$2\ Al(OH)_3$ Aluminum Hydroxide		
4	"Phosphate"	Mono Calcium phosphate (Acid calcium phosphate)	$8\ NaHCO_3$ Sodium bicarbonate	+	$3\ CaH_4(PO_4)_2$§ Mono calcium phosphate	⟶	$8\ CO_2$ Carbon dioxide	+	$Ca_3(PO_4)_2$ Tricalcium phosphate	+	$4\ Na_2HPO_4$ Disodium phosphate	+	$8\ H_2O$ Water
5	"Combination"	Sodium Aluminum Sulphate & Mono-Calcium phosphate	Combination of reactions for Types 3 and 4, with added formation of Dicalcium phosphate, ($CaHPO_4$) and Basic Aluminum phosphate, ($Al_3[OH]_6PO_4$)										
6	"Acid Pyro"	Acid Sodium pyrophosphate	$2\ NaHCO_3$ Sodium bicarbonate	+	$Na_2H_2P_2O_7$ Sodium acid pyrophosphate	⟶	CO_2 Carbon dioxide	+	$2\ Na_2HPO_4$ Di-sodium phosphate	+	H_2O, or Water		
			$2\ NaHCO_3$ Sodium bicarbonate	+	$Na_2H_2P_2O_7$ Sodium acid pyrophosphate	⟶	$2\ CO_2$ Carbon dioxide	+	$Na_4P_2O_7$ Normal sodium pyrophosphate	+	H_2O, or both Water		

* Employed only in conjunction with cream of tartar.
† Not used alone, but invariably with mono calcium phosphate, exerting a retarding effect upon the rapid reaction between the latter and soda, in the cold. Sodium aluminum sulphate disengages CO_2 from $NaHCO_3$ almost immediately at oven temperatures.
‡ Glauber's salt.
§ Contains 1 molecule of water of crystallization.

E-1 Type A, E-2 Type B, E-3 Type C — Prepared with acid media (1), (2), and (3) respectively, as enumerated in the before mentioned standard,

E-4 Type D — Includes a combination of acid reactants; namely, compounds of aluminum, and acid salts of phosphoric acid. The total mixture shall contain not more than 4.2% of alumina (Al_2O_3) and not less than 5.5% by weight of phosphorus pentoxide (P_2O_5),

E-5 Type E — Combination of acid reactants as in Type D, but in such proportions, however, that the total mixture shall contain not more than 6.2% of alumina (Al_2O_3) and not less than 2.8% by weight of phosphorus pentoxide (P_2O_5).

Uniform requirements applying to all of these types designate the powders to be prepared in a proper manner, free as possible from metallic impurities, and containing not less than 12% of available carbon dioxide. Momentary digression at this point is warranted by the importance of differentiation between results of total, available, and residual carbon dioxide assays of baking powders. Total gas content represents the maximum percentage of carbon dioxide obtainable by decomposition of a leavening preparation with acid in the course of its analytical evaluation. This factor, while providing an indication of the effectiveness of the mixing process, serves concurrently as a confirmatory check of the ratio of soda to the other intimately associated ingredients.

Available carbon dioxide denotes the percentage of leavening gas liberated from a baking powder in reactions induced by water, thereby simulating to practical degree, the potential activity of the preparation under conditions of actual use. This value represents the critical factor in technical and general comparisons of chemical leavening mixtures on the basis of their aerating efficiency.

Percentage difference between Total and Available carbon dioxide corresponds to Residual CO, representing the amount of gas attributable to undecomposed soda, indicating the extent of preponderance of the alkali over the acid media present.

The composition of baking powders for commercial distribution, involves blending of mixtures of the following materials in accord with type, quality, leavening efficiency, and reaction velocity required:

(1) Sodium bicarbonate,
(2) Tartaric acid,
(3) Potassium acid tartrate, (Cream of Tartar)
(4) Sodium acid pyrophosphate,
(5) Mono calcium phosphate,
(6) Sodium aluminum sulfate,
(7) Redried corn starch.

Several of these ingredients are defined in the U. S. Pharmacopoeia[4] coinciding with, and frequently exceeding, the standards of purity designated by that authority. Sodium bicarbonate, tartaric acid, potassium acid tartrate, and corn starch are recognized by the Pharmacopoeia, but the starch as therein described is unsatisfactory as a constituent of chemical leavening preparations. Baking powder requires a low-moisture re-dried corn starch, preferably containing not more than 8 or 9 per cent. of moisture, thereby insuring stability of the mixture. The official starch may contain as much as the permissible maximum of 14 per cent. of moisture, in which form it is ordinarily adapted to technical, food, and pharmaceutical purposes.

Sodium bicarbonate, commonly known as baking soda, used in chemical leavening preparations is the most economical source of carbon dioxide now in general use. This alkali is readily neutralized, yields a large volume of gas, and is one of the purest industrial chemicals available in present-day commerce.

Owing to the complexity of reactions of sodium aluminum sulfate and the acid phosphates with soda, these compounds are evaluated according to their neutralizing values per 100 parts in terms of the alkali. The potential activity of tartaric acid and potassium acid tartrate, however, may readily be interpreted on the basis of their titrable acidity. Anhydrous sodium aluminum sulfate employed in leavening preparations is a purely physical mixture. Its status must not be confused with the chemical compound aluminum-sodium sulfate commonly designated as "soda alum," containing 24 molecules of water of crystallization. The methods of preparation,[5, 6] and properties of these two commodities are quite different; their diversified structures as proven by repeated investigations were only recently again verified by x-ray[7] and ultra-violet radiation[8] studies demonstrating them to be totally separate and distinct entities.

Numerous constituents have been proposed for modification of the commonly accepted baking powders, primarily for the purpose of introducing innovational features[9] not afforded by the ingredients previously enumerated. Modified leavening mixtures containing novel constituents do not as a rule prove economically expedient or commercially feasible, such proposals invariably proceeding no further than the patent archives. Incorporation of calcium lactate[10] or dried cultured buttermilk of high acidity,[11, 12, 13] as examples, serve definite practical purposes in baking powders, both substances having at this time found appropriate applications as constituents of commercial leavening preparations. Baking powder constituents that are not subject to mandatory supervision reflect continuous improvement in their quality coincident with best contemporary technological practice. Progressive developments in this respect are imperative in view of acute competitive obligations imposed upon the chemical industries in general. This aspect is worthy of prime recognition inasmuch as it provides the necessary stimulus to research and an added incentive toward constant vigilance in the maintenance of quality production.

Particular acknowledgment is due to all sources of food chemicals, particularly the baking acids, for excellent results achieved in reduction of undesirable metallic contaminations. These, if present, are invariably below

tolerances promulgated by the Federal Government in the enforcement of food regulations. With gradual improvements in requisite technological efficiency, these contaminants will be reduced to a degree approaching the vanishing point as has been done with some undesirable metallic inclusions. A distinct contrast is at once manifest upon realization that four or five years ago, the adventitious content of metallic impurities in certain food chemicals amounted to as much as 400 parts per million. This contamination has now been reduced to less than 10 p.p.m., with research being incessantly pursued and processes constantly improved for further substantial reduction of the present insignificant quantities of undesirable elements, without impairment of required strength of the basic material, or differential increase in cost.

While equipment of a baking powder plant varies primarily in accord with the magnitude of production, the essential features nevertheless consist of weighing, sifting, and mixing appliances. Maintenance of consistent uniformity, so far as mechanically possible, is of prime consideration in compounding chemical leavening preparations.

Assuming correct proportions of raw materials of accepted purity and initial particle fineness, to be assembled for compounding a baking powder, the next step consists of sifting the stock through mechanically operated screens. These are usually of a box type, wherein two or more inclined sieve surfaces are superimposed within a rigid compartment to which is imparted a gyratory motion. Any friable aggregates are reduced in size and only material of consistently uniform granular fineness is discharged into the mixing tanks; any portion of stock resisting the action of sifters is automatically removed and subsequently discarded. The several ingredients having been passed through screens into the mixing compartments, the process from this point now assumes formidable importance. This circumstance arises from the fact that complications may inevitably ensue in efforts to effect uniformity of composition through mixing of dissimilar pulverulent or granular solids. Mechanical mixing of bulk quantities

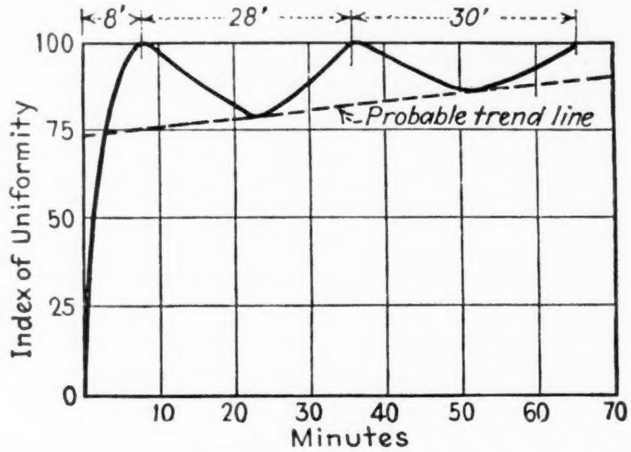


Chart 3. Showing progress of mixing. It is important to stop the machine when the index of uniformity is at its maximum. This phenomenon of alternate mixing and partial unmixing varies with every mixer and mixture, and is observable only when mixing dissimilar granular substances. Courtesy "Food Industries."

of such dry materials in a more or less fine state of subdivision involves numerous factors including among others, the densities and particle size of the powders, as well as the duration and speed of agitation. Each mixing appliance, even though constructed as an exact duplicate of another, is characterized by an individual efficiency factor based on time required to yield a perfect mixture. Size of batch and number of ingredients are further variables that exert significant influence upon the degree of physical homogeneity of a powdered mixture.

Burton[14] in an interesting exposition of this subject cited investigations of Catlin[15] as to possibilities of inducing alternate states of physical heterogeneity through excessive mixing of materials comprising a baking powder. The efficiency of any mixing involving powdered materials does not proceed uniformly to a definite state of completion, but is subject to variations that can be plotted by a series of symmetrical undulations denoting mixing, and unmixing or segregation. These phases are indicated in the accompanying graph based on data obtained in the course of mixing a 5,000 pound batch of baking powder.[15 16]

It is apparent in the above instance stressed by Burton that 28 minutes of machine operation would prove totally unproductive if mixing were prolonged beyond the initial peak. Extra motive power consumed during the 28-minute period, for example, tends to a needless expenditure of time, labor, and electricity, in addition to unnecessary delay in production. Burton

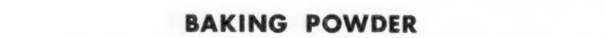


Chart No. 2. Courtesy "Food Industries."

defined Index of Uniformity as an arbitrary indication of the physical condition of a powdered mixture, on a scale ranging from 100 to 0; these extreme points denote degrees of uniformity varying respectively from a state of perfect mixing, to visibility of only one ingredient in an observed microscopical field. An index of 50 would accordingly represent a condition resulting from very inefficient mixing, while even 85 would indicate an average deviation of 15% from an ideal mixture.

As a microscopical procedure the technic is based upon enumerations of the various particles constituting a tentative sample of a mixture. Numerical comparisons of the mean ratios of such particles with those of a particular constituent are referred to standard ratios representing known proportions of the various ingredients in a specified formula. The original paper[16] should be consulted for further analytical details, particularly for the application of the method to mixtures of more than two components, calculation of average deviation and percentage index of uniformity. Such variations in tentative batches of baking powders can also be ascertained by the gasometric method for total carbon dioxide in samples successively withdrawn from materials in process of mixing. The microscopical procedure, however, is preferable to that of gas assay chiefly for the general facilities afforded in consecutive repetitions of particle counts.

Any subsequent agitation occasioned in transit from storage bins to filling units is capable of inducing partial segregation of one or more components of the baking powder, thereby effecting an index of uniformity lower than noted on leaving mixers.[15, 16] This condition, however, will engender little or no effect upon the product from a practical standpoint in its general application. The flow of finished baking powder from mixers to storage bins is effected by gravity, and by this means also frequently diverted directly to can-filling units. Propulsion by screw-drive through enclosed horizontal channels is another method employed for conveying powder to packaging devices. This arrangement provides an efficient expedient when any distance is to be traversed between points of storage and can-filling. In either case, the flow of the product may be appreciably affected by variations in prevailing humidity. This condition is evident in the differences in volume of the automatically delivered weights of powder deposited in cans. Circumstances of this sort necessitate adjustments of delivery devices, to obtain weights of consistent uniformity, or well within tolerances imposed by regulatory stipulations based upon established trade practices. Methods of filling containers, as well as selection of types of closures for individual units of finished product, are matters of importance. An ideally formulated baking powder may be deprived of its inherent stability if packed in defective cans, or if closures prove inadequate.

The magnitude of American baking powder manufacture justifies its position as a major food industry, concurrently warranting legitimate inclusion among important chemical activities in general.

Apparent Per Capita Consumption of Baking Powder in the United States[17]

	1927 *Pounds*	1931 *Pounds*	1935 *Pounds*
Production	162,907,334	169,641,173	155,723,766
Exported	4,748,197	4,177,257	2,502,128
Consumption	158,159,137	165,463,916	153,221,638
Per capita consumption	1.34	1.33	1.20

American manufacturers for years past supplied not only domestic requirements, but have, as well, created foreign demand for the commodity to the extent indicated in the following table.[17]

Calendar Year	*Pounds*
1932	2,570,151
1933	2,779,024
1934	2,752,635
1935	2,502,128
1936	2,250,733
1937	2,613,955

The geographical distribution of the product is of significant interest. Of the total United States exports of the 1927 baking powder production, for example, British South Africa received the bulk, amounting to practically 700,000 pounds. Next in their respective order were, Mexico, Great Britain, Argentine, the Philippine Islands, and Sweden.[18]

ACKNOWLEDGMENTS

Sincere appreciation is herewith accorded to the United States Department of Commerce, Washington, D. C., and Dr. L. V. Burton, Editor of Food Industries, New York, for their courtesies in submitting data and illustrations included in the above discussion.

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2. With few exceptions, this Definition & Standard has been adopted by individual states for the regulation of purity and efficiency of chemical leavening preparations in intrastate commerce.
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8. Unpublished data in possession of the author.
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10. U. S. Patent No. 1,427,979 (1922).
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15. Conducted in plant of The Rumford Chemical Works, Providence, R. I.
16. Burton, loc. cit.
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Technical Banking Service

The Constructive Idea of Bert H. White

RECENTLY a new thought in banking has been born—or it may be the reincarnation of some old-fashioned constructive banker with a sense of responsibility to the community. Whichever it may be, it is likely to be a fine thing, if some greedy bankers do not prostitute the service to mere advertising.

A young man named Bert White, of the Liberty Bank of Buffalo, N. Y., appears to be its real parent and legitimately so, because he shows the parent's unselfish interest in its growth, promise, and safety of execution.

Briefly his idea is to make technical service and cooperation in helping manufacturers out of their troubles a part of his bank's service to the community. Mr. White believes that the best assurance of prosperity and stability which a bank can build up is the prosperity of the community, rather than over coddling of its own depositors and particularly its largest depositors. This service must be real, not fictitiously grand outside and inside a hollow sham. Also this service must not be solely, or even mainly, for the few already successful corporations which have generally proven their own ability to take very good care indeed of themselves. Rather it is the vastly greater number of smaller manufacturers and industrial producers who need help to develop in the aggregate, vast producing-purchasing power for a stable foundation for the prosperity of the community as a whole including the banks and the larger manufacturers.

Mr. White knows that many employees suffer with and because of their employers' difficulties. He knows that many such employer's difficulties have been solved by suppliers of materials and equipment, and many more of them can easily be solved for others who are in trouble. Also, he knows that if he is honest, intelligent, and sincere in his effort to aid the purchasers, he can have a vast deal of help supplied to them by manufacturers who are anxious to help in order to sell these purchasers machinery, materials and equipment. He has learned by study and observation that the most promising of these sources are those which do for themselves most investigation into their own raw materials, methods, equipment and appliances.

Hence, he has gone to companies having research organizations, to their men of science with only indirect interest in sales; and has obtained permission from wise executives to ask and is receiving the technical service and cooperation of their research organizations in solving the problems of smaller industries. He has thus opened to such small industries the technical help of many of the largest and most progressive industries in the country. He has found by actual experience that, not only do those who appeal through him get help, but in most cases the help is truly practical and useful.

This aid has not been only for his own bank depositors. Payment for aid is not asked or accepted when offered. Not even a suggestion to shift a deposit to his bank was accepted when offered as a recompense for important, if not life-saving assistance obtained for a depositor in another bank.

Of course other banks, particularly those competing in large cities, will try to seize upon the idea as an aid in competitive banking war. They had best wait till they are sure what their doing so may mean. They may very well hurt themselves more than they can help themselves.

One of the last things they are likely to recognize is one of Mr. White's most serious considerations. Where is he to get and how can he train a group of technically educated assistants who can carry the burden of the detail of this work and make it more efficient as it grows. Such men have to be young because gratuitous service cannot be very highly paid by the bank. Yet their trustworthiness must be beyond question, and the ability to acquire an industrial point of view will be essential. Bankers who think they can pick up this plan and put it into operation successfully as a mere business getter, or worse a mere advertisement, would be wise in advance to recognize that one real mistake will do more to ruin their reputations for safe and conservative banks than all the temporary business they might gain could possibly repay.

In time, the utility of this plan may grow until it is safe to include, and can afford to include, the service of independent consultants. But that time is not yet. Of course, the present need is to bring together the now-available corporate laboratories to which increased familiarity with the industry and the needs of particular businesses will be adequate reward to the corporation and no payment for the service will be involved. For the time being, this will be of great value to the corporations. Later, however, when the corporations feel that such contacts do not compensate for the interruption of their work, the plan is likely to languish. The corporate laboratories do not exist as a sheer luxury. When this gratuitous service ceases to be available, the question will arise, "Who shall pay for it?"

CREATING INDUSTRIES
1918—1938

A Series of Fifty Articles Reviewing the Progress of American Chemical Industry

Insecticides and Fungicides

By R. C. Roark

Dr. Ruric Creegan Roark, the Government's outstanding insecticide authority, was born March 13, 1887, at Glasgow, Ky. He attended Kentucky State and Clark Universities during 1903-06; received his B.A. from Cincinnati in 1907, and M.A. from Illinois in 1908; during 1910-11 he studied at Wisconsin, and won his Ph.D. at George Washington in 1917. He served as Chief Chemist for the U. S. Sanitary Specialties Corp.; Research Chemist for General Chemical, later as Chief Chemist of that company's Baltimore plant for four and one-half years. For the past thirteen years he has been Chemist, Bureau of Chemistry, Department Agriculture, and his insecticide investigations have covered thoroughly the subject in its practical and economic aspects. He belongs to Sigma Xi, is charter member of the Illinois Academy of Science; member, A. C. S., the A. A. A. S., American Association of Economic Entomologists.

Rubber Compounding

By William C. Geer

Since 1907 Dr. Geer has devoted himself to the technical problems of rubber compounding. He was born June 17, 1876, at Ogdensburg, N. Y., and graduated from the State Normal School at Potsdam in 1897; received his A.B. from Cornell in 1902, and Ph.D. in chemistry and physics in 1905. For two years he was with the U. S. Forest Service working in wood distillation, and went to The B. F. Goodrich Co. at Akron in 1907. He retired as vice-president in charge of research and development in 1925, and after a year abroad returned to engage in private research. During the War he was Chairman, Gas Defense Division, War Service Committee of the Rubber Association. He has been trustee of the Ithaca Savings Bank; president, Ithaca Community Chest, and president, Akron Y. M. C. A. He is a Fellow of the A. A. A. S.; honorary member, Institution of the Rubber Industry (Great Britain); member A. C. S., A. I. Ch. E., Sigma Xi, and the Chemists' Club (N. Y.).

This Series of Articles will be Continued Each Month

Insecticides and Fungicides

1918—38

By R. C. Roark

Division of Insecticide Investigations, Bureau of Entomology and Plant Quarantine
U. S. Department of Agriculture

TWO important developments in insecticides and fungicides during the past two decades are the great increase in the consumption of all types of these materials, especially calcium arsenate and lead arsenate, and the commercial use of new materials, especially synthetic organic compounds and products derived from derris and cube.

Insecticides are now used in the United States on a greater scale than ever before. This is due partly to the introduction of new insect pests. Some of the species that have recently gained entrance to this country and the dates of their discovery are: the oriental fruit moth and the Japanese beetle in 1916, the European corn borer in 1917, the Gulf wireworm in 1927, the strawberry fruitworm in 1929, the vetch bruchid in 1931, the European spruce sawfly in 1932, and the white fringed beetle in 1936. At present the Japanese beetle is the only one of these species combated with a significant quantity of insecticide. However, insecticides will play an important part in the economic control of these other insects as new materials and more effective ways of applying them are developed.

The principal reasons for the greater use of insecticides, however, are the great increase in numbers of species that have long been with us, such as the codling moth, and the public demand for foods free from even traces of insect life and insect damage. Insect populations have increased, not because of neglect by the farmer, but because increased planting and more intensive cultivation of those crops upon which the insects feed have created an opportunity for their multiplication. Under normal conditions more boll weevils will be found on 2,000,000, acres of cotton than on 1,000,000 acres of cotton. Crops on a large acreage basis make conditions ideal for larger populations of insects that attack these crops. The growing of apples on thousands of acres of land in the Wenatchee and Yakima districts of Washington supplies the codling moth with an ideal environment. Greater insect populations necessitate the use of more insecticides.

We are more insect conscious than formerly which explains the increased use of household insecticides. The demand of the consumer for fruit without blemish has required a use of orchard insecticides much greater than was formerly considered necessary for the control of the same insect population.

Accurate figures on the consumption of insecticides and fungicides are difficult to obtain. Many manufacturers are reluctant to divulge production figures, and this is especially true when a product is made by a few companies or perhaps by only one company. The table herewith contains the most accurate figures it has been possible to collect.

Estimated U. S. Consumption of Insecticides and Fungicides 1936

Item		*Quantity*
Arsenicals:		
Lead arsenate	lbs.	44,000,000[1]
Calcium arsenate	"	45,000,000[2]
Magnesium arsenate	"	200,000
Paris green	"	3,000,000
White arsenic	"	949,800[3]
Sulfur compounds:		
Calcium monosulfide	"	500,000
Lime-sulfur (dry basis)	"	43,000,000
Sulfur dust	"	30,000,000
Oils and organic compounds:		
Kerosene	gals.	12,000,000
Creosote (wood preserving)	"	154,712,999
Mineral-oil emulsions (85% +)	lbs.	40,000,000
Petroleum (wood preserving)	gals.	22,624,318
Naphthalene	lbs.	16,500,000
Paradichlorobenzene	"	5,000,000
Light petroleum oils (cattle sprays)	gals.	2,000,000
Hydrogen cyanide, liquid	lbs.	2,000,000
Plant insecticides:		
Pyrethrum, crude	"	11,756,979[4]
Nicotine sulfate (40%)	"	2,000,000
Derris	"	510,337
Cube	"	1,829,056
Fungicides:		
Copper sulfate	"	12,000,000
Zinc chloride	"	4,127,886
Sodium fluoride	"	4,000,000

[1] 1937 consumption.

[2] 1937 consumption of calcium arsenate was only about half that of 1936.

[3] This is the amount supplied as grasshopper bait by Federal and State agencies only, mostly in the form of a solution of sodium arsenite. The consumption in 1937 was 7,037,140 pounds.

[4] Imports of pyrethrum flowers during the first 11 months of 1937 broke all previous records, amounting to 17,947,196 pounds.

The increased use of insecticides during the last two decades is shown by a comparison of the production of the arsenates of lead and calcium in 1919 and 1936.

		1919	*1936*
Lead arsenate	lbs.	11,514,275	40,000,000
Calcium arsenate	"	1,191,868	45,000,000

Although the consumption of all insecticides is greater than twenty years ago, this increase has by no means been uniform from year to year. On the contrary, there have been great jumps and also great drops in the amounts used from season to season. This fluctuation is strikingly shown by the figures for the production of calcium arsenate and Paris green in 1926 and 1927.

		1926	*1927*
Calcium arsenate	lbs.	5,363,320	18,715,563
Paris green	"	2,863,691	5,743,048

Again the 1937 production of calcium arsenate is estimated to be only one half that of 1936.

The great variation from year to year in the consumption of certain insecticides is due chiefly to differences in the abundance of those insects for whose control they are used. For example, the principal use of calcium arsenate is for dusting cotton plants to protect them against the boll weevil. When an unusually cold winter or unfavorable climatic conditions during the growing season diminish the boll weevil population, the consumption of calcium arsenate drops, and conversely an increase in boll weevils stimulates the use of calcium arsenate.

Another important factor in determining how much insecticide is used is the market price that the farmer receives for his product. It is cheaper to let the insects devour the crop than to buy insecticide for a crop that must be sold below the cost of production. High-priced tobacco, such as wrapper tobacco for cigars, receives more frequent applications of insecticides than does low-priced tobacco. Both practices are economically sound. Normally, however, the farmer is glad to use insecticides and fungicides, because their economic indispensability has been amply demonstrated. In California for the past several years from $3,000,000 to $5,000,000 has been expended annually for citrus-pest warfare in an attempt to produce high-grade fruit. In spite of this huge expenditure the loss from reduced grades and lessened production due to insects some seasons has been very large, but without adequate control it would have been overwhelming.

The retail cost of all insecticides and fungicides sold in the United States is probably not less than $100,000,000 annually, and the trend is toward the use of a greater variety of these products in ever increasing amounts. It is no exaggeration to say that the food supply of the Nation is dependent on the intelligent use of insecticides and fungicides.

In addition to the increased use of the older insecticides, new materials are now coming into widespread use. Prominent examples are derris and cube. Derris is the root of a leguminous vine that grows in the East Indies and British Malaya. Cube is the root of a leguminous shrub that grows in the Amazon Valley. These plants are closely related botanically, and they contain the same insecticidal constituents, of which rotenone and deguelin are the most important.

The insecticidal action of derris was first described in an English publication as far back as 1848, but not until 1911 was it used in proprietary insecticides in England. About 1930 derris began to be imported into the United States, and in 1936 a total of 510,337 pounds was brought in.

The insecticidal action of cube was discovered by Dr. N. E. McIndoo, of the Bureau of Entomology and Plant Quarantine, about 1920. The botanical identity of this root was not ascertained, however, until 1930, and following this identification and the finding of rotenone in the root by Dr. E. P. Clark, also of the Bureau of Entomology and Plant Quarantine, the use of this material as an insecticide increased very rapidly. In 1936 1,829,056 pounds were imported, mostly from Brazil and Peru.

Whereas derris was first used as an extract to combat greenhouse pests and in the form of impregnated powder to kill fleas on pet animals, its principal use at present is in dusts for application to cabbage, beans, peas, and other truck crops. Their close chemical relationship enable cube and derris of equal grade to be used interchangeably for most purposes. This use of rotenone products on truck crops has decreased the use of arsenicals, especially magnesium arsenate. The substitution of these relatively non-poisonous insecticides for poisonous arsenicals is a most significant development.

The demand for foodstuffs of the highest quality by the consuming public and the establishment of grades and standards requiring products to be free from insects, and regulations on amounts of poisonous elements remaining as residues on truck and vegetables have greatly stimulated the use of the rotenone plants and also pyrethrum. Pyrethrum, when first introduced into the United States, was used as a dust to control cockroaches and other household insects. Later its principal use was in household fly sprays in kerosene or a similar hydrocarbon oil as a vehicle. More recently there has been renewed interest in pyrethrum dusts, made either by mixing finely ground pyrethrum flowers with an inert diluent or by absorbing pyrethrum extract dissolved in a volatile solvent in an absorbent material such as clay and then evaporating the solvent. These powders are used against cabbage worms and other agricultural pests.

Although pyrethrum and the rotenone-bearing plants compete, more correctly they supplement each other. Rotenone and pyrethrum are highly specific in their action, and some insects killed by rotenone are not affected by pyrethrum, and *vice versa*. For example, the celery leaf tier, a serious pest in Florida and other places, is readily controlled by pyrethrum, but the rotenone preparations have no effect on it. The future market for these plant insecticides is very great. The Bureau of Entomology and Plant Quarantine and many State entomologists, as well as commercial entomologists, are busy testing pyrethrum, derris, and cube against the principal insect pests. New applications

are found from time to time, and as they become better known their use will undoubtedly increase.

The cost and other factors involved in the removal of residues of arsenic, lead and fluorine and the absence of satisfactory methods of removal of such residues from various crops, especially cauliflower and other vegetables, have caused the recommendations regarding the use of insecticides that contain these poisons to be modified. Many growers of vegetables have already abandoned the use of arsenical insecticides. Modern fruit packing houses are equipped with methods and technique for the satisfactory removal of residues and most of the apple crop is washed to meet government requirements. This problem is most serious only in the arid, irrigated sections. Changes have also been made in the use of these materials for fruit crops. New materials may in the future replace arsenicals for the control of insects on food products.

The search for new synthetic organic compounds useful as insecticides and fungicides has been vigorously prosecuted. There are many advantages inherent in the use of an organic over an inorganic chemical as an insecticide. Compounds of the highest toxicity to insects and low toxicity to man are more likely to be organic than inorganic. Synthetic organic compounds also have certain advantages over compounds of plant origin. The content of the active principle in any plant, such as rotenone in derris and cube, nicotine in tobacco, and the pyrethrins in pyrethrum flowers, is extremely variable. Furthermore, we are in the unfortunate position of having to import some of our most important insecticides of plant origin. Derris and cube come wholly from abroad. The amount of pyrethrum grown in the United States is insignificant. Moreover, chemical evaluation of these plant insecticides is difficult, and for many constituents of these plants, for example, deguelin, tephrosin, and toxicarol in derris root, no methods are available. On the other hand, the chemist always knows exactly what he is working with when he handles a synthetic product. A synthetic product can be produced of uniform strength. Moreover, synthetic insecticides can be produced from petroleum, shale oil, natural gas, coaltar, alcohols, and other raw materials which are cheap and extremely abundant in this country.

Some organic chemical compounds widely used as insecticides are hydrogen cyanide, carbon disulfide, carbon tetrachloride, ethylene dichloride, propylene dichloride, ethylene oxide, chloropicrin, methyl formate, and methyl bromide as fumigants; lauryl thiocyanate and various other thiocyanates as contact insecticides; and phenothiazine as a stomach-poison insecticide. It is almost impossible to estimate the amount of any one of these materials used as an insecticide. Some materials, such as carbon disulfide, carbon tetrachloride, and ethylene dichloride, find wide industrial use. It may be said, however, that the use of these materials, while not great from a tonnage standpoint, is growing.

The biggest insecticide market is naturally agricultural, and here the principal demand is for a stomach poison non-toxic to human beings that will kill the insects eating fruits and vegetables sprayed or dusted with it. Although research has long been carried on, only recently have materials been developed which really show any promise as substitutes for arsenic for this insecticidal use. Among materials recently developed for this purpose may be mentioned phenothiazine, phenothioxin, dimethyl acridan, and a number of halogen-substituted phenylazo compounds. Most work has been done with phenothiazine and the most is known of its action. Against mosquito larvae phenothiazine is more toxic than rotenone, being effective at a concentration of only one part in one million parts of water. Against codling moth larvae it is more effective than lead arsenate under laboratory conditions. On the other hand, its physical properties prevent it from adhering to the skin of an apple as well as does lead arsenate, and in eastern United States, where summer rains are frequent, the deposit of phenothiazine is often removed and hence fails to afford protection. Studies are now being conducted to overcome this lack of adhesiveness by the addition of a supplementary sticker. It is confidently believed that a solution to the difficulty may be found.

Inasmuch as about 40,000,000 pounds of lead arsenate have been consumed annually in the United States during recent years, it is obvious that a very large market awaits a successful substitute for it. Although no organic compound may be expected to sell as low as the present wholesale price of lead arsenate, namely, 13 cents per pound, the difference in cost may be largely offset by greater effectiveness, thus permitting a reduced dosage. The objections by the consuming public to the presence of harmful insecticidal residues on fruits and vegetables may force the grower to use less harmful substitutes even if the cost may be somewhat greater.

Throughout the world are 624,300 recognized species of insects. In addition there are about 16,000 species of mites, ticks, spiders, and similar invertebrates. More than 7,000 of these species cause economic losses in the United States. About 10 per cent. of all growing crops are consumed by insect pests. In addition insects attack stored products, wooden buildings, forests, clothing, livestock, and man himself. Damage caused by insects in the United States may be conservatively reckoned at about $2,000,000,000 annually. The loss due to injurious fungi may be estimated as half that caused by insects, making a total of $3,000,000,000.

As our agriculture expands and new insects come in from abroad we cannot expect the annual toll taken by our animal and plant enemies to diminish. On the contrary it will grow and can be held in check only by the extensive use of insecticides and fungicides. A bright future awaits the manufacturer of these protective agents, this ammunition which man must have in his ceaseless warfare against pests.

Rubber Compounding

1918—38

By William C. Geer

THE great achievements which have most profoundly affected the quality of rubber goods originated prior to the World War: vulcanization by sulfur, Goodyear 1837; plantation rubber, Wickham 1876; alkali reclaimed rubber, Marks 1898; the organic accelerator of vulcanization, Oenslager 1906; carbon black as a reinforcing agent, 1912 (discoverer not precisely known); organic antioxidants, earlier than 1914. Before 1914, however, the rubber compound was designed by guess—trial and error. During the War long strides were made, and since 1918 rapidly expanded research by well trained chemists, physicists, and engineers, has brought the compounder and designer definite knowledge and a wide choice of materials.

A rubber "compound" is a mixture or dispersion of sulfur and one or several of a number of other ingredients into crude rubber, which after it has been heated or "vulcanized" is found to have acquired changed and valuable physical properties. It is not something to be mixed, sold as such, and pieces of it cut off for specific uses. Nor does it exist in one simple condition to be applied in different shapes to a large number of different uses. Crude rubber, its chief ingredient, is fundamental. When various substances are mixed with crude rubber in different proportions, there can be produced almost an infinite variety of vulcanized rubber mixtures, each with differing properties and each adapted to specific uses.

But in no rubber article is its value, quality, or cost economy due to any single chemical substance, ingredient, or process. Whatever rubber compound one may select for a particular purpose, design, the matter of size, and of shape, must still be considered. Then, too, the vulcanized rubber compound possesses certain limitations. The very extensibility and elasticity which are its essential characteristics limit its use and for many articles require the use of fabric to insure permanence of dimension.

Thus, the rubber industry employs thousands of different raw materials, combines them with other thousands of weaves of cotton fabric, and forms them into upwards of an hundred thousand articles of utility for the home, office, hospital, motor cars, airplanes, and factories, of which the annual value is now well toward one billion dollars.

A mere catalog of rubber products and uses would require more space than is possible in this review. Deliberately, therefore, certain outstanding features are chosen which may be considered typical of the industry. Of the few groups of raw materials selected for review, these are the ones which have manifested the greatest advance in chemical knowledge and scientific application during the past two decades. They are also those which have induced noteworthy changes and improvements in nearly all rubber articles.

Crude rubber itself has changed during these years. The numerous grades of "wild" rubber from Brazil, Central America, and Africa, which were dirty, of widely different chemical and physical properties, have given way almost entirely to rubber of plantation or cultivated origin. In 1937 only 1.66% of our imports were of the wild grades. All the 98.34% was the product of the *Hevea brasiliensis*. Fig. 1 shows the rapid rise in crude rubber consumption in long tons.

Twenty years ago plantation rubber was badly packed in wooden boxes, and some tonnage of dirty scrap grades was shipped. For many purposes, therefore, washing was required. But of late improved methods of tapping, of collection of latex, coagulation, and treatment have been introduced, with consequent notable improvement in physical properties, cleanness, and uniformity. Much study is still needed to free raw rubber from the quality variations due to the season of the year when the trees are tapped, the age of the tree, geographical location, soil condition, genetic strain of tree, and tapping method.

The rubber factories have benefitted because of these technical advances, but they have suffered far more from the radical fluctuations in the market price of crude rubber. The average market price of $1.0284 per pound in 1910, against a production cost of about 25c and the rapidly growing demand, stimulated Europeans to clear the jungle and to plant rubber trees. In 1915 the rubber acreage was 2,293,000; in 1919, 3,321,000; and in 1937 the Bureau of Foreign and Domestic Commerce estimates between 8 and 9½ million acres.

Two efforts at planned production control have been made, but have not stabilized the market, and the price of crude rubber still is extremely sensitive to speculative influence, to variation in demand, and to changes in production. Fig. 2 shows how variable have been these prices in comparison with the All Commodity Index. On the International Rubber Regulation Committee rests a very heavy responsibility in the establishment of quotas, so that uniformity of price without detriment to either producer or consumer may be realized, for any commodity that fluctuates so widely is treacherous alike to producer and consumer. Therefore, the compounder must be alert and prepare to alter his mixtures, while the search for low and uniform cost synthetic rubber goes on apace.

Botanists, chemists, and students of tropical agriculture have made notable achievements in methods of cultivation and production of rubber. Twenty years ago the average yield of dry, crude rubber per acre per year was approximately 300 pounds. In 1934 it had become 483 pounds; by skill in selection of trees it is possible to obtain yields of 1,200 pounds, and unusual ones as high as 2,000 pounds per acre per year. Twenty years ago the cost of a pound of crude rubber ready for shipment from the Far East was variously estimated at from 16c to 25c. Today a cost of about 12c is average.[9] Considering a possible average yield of, say, 1,000 pounds per acre, a base cost of under 10c a pound is capable of realization.

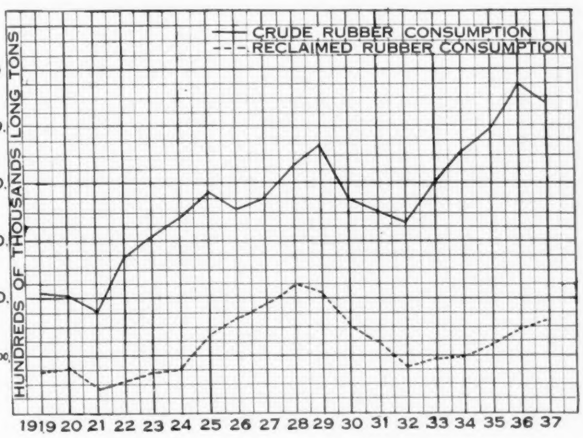

Figure 1. Data from Rubber Manufacturers Association

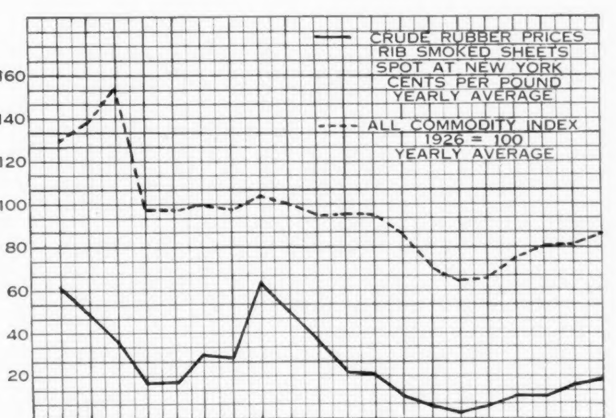

Figure 2. Data from Standard Statistics Co., Inc.

Price and volume of crude rubber are influenced by its leading competitor, reclaimed rubber, which is merely used vulcanized rubber such as tires, etc., freed from cotton fiber and plasticized so that it may again be mixed with crude rubber for a variety of uses. There has not been much change in the quality of reclaimed rubber or in the methods for its production during the last 20 years. It, however, is useful in reducing the softness or plasticity of rubber articles which in turn facilitates physical fashioning and processing operation.

In Fig. 3 has been plotted the average price of crude rubber and the ratio of consumption of reclaimed to crude. The rubber chemist-compounder watches the price of crude rubber and alters his formulas. High prices induce high percentages of reclaimed; but the consumption ratio was never below 20%, even when the crude price fell to less than 3c! For, although by physical tests reclaimed rubber does not possess the strength after vulcanization of a crude rubber mixture of the same essential composition, nevertheless it has a particular value and has been and still will be used in rubber compounds. It has a certain stiffness advantageous in the manufacture of certain articles for which the composition should be free from the extreme softness and stickiness of many unvulcanized crude rubber mixtures. Moreover, the time required for vulcanization is somewhat shorter. So reclaimed rubber represents a potential waste saved, and is a means of smoothing out factory production methods, and is useful for its influence upon the price of crude. Its theoretical price value has been stated to be about one half that of crude rubber,[7] and the market price has been relatively constant. Since the capacity of reclaiming plants is some 261,753 long tons,[1] and since the imports of crude rubber in 1937 amounted to 600,476 long tons, the degree of this stabilizing influence may be inferred. No method has yet been devised to return vulcanized rubber to its original, unvulcanized quality.

Organic Accelerators and Antioxidants

In the old days three hours at 288° F. were required to vulcanize tires. The compounds contained high sul-

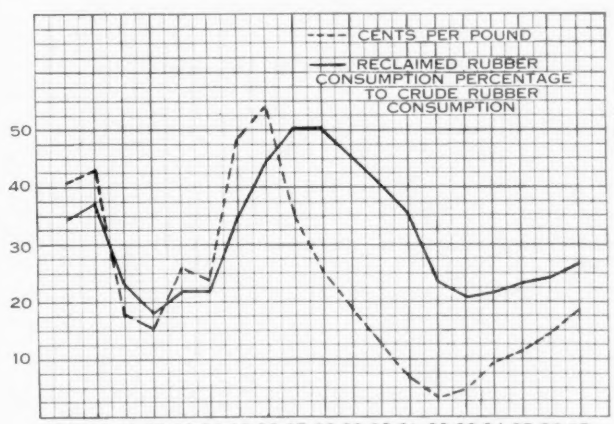

Figure 3. Data from Rubber Manufacturers Association

fur proportions, one ounce to the pound of rubber, and the quality variations were large. Inorganic substances, litharge, etc., were used as accelerators to hasten the rate of vulcanization, or cure. The consumer and the manufacturer were plagued by off quality products too hard because of "overcure" or too soft from "undercure," and rubber goods had a bad habit of "perishing" with ease and frequency.

Thousands of substances which speed the rate of vulcanization and which retard deterioration due to oxidation have been found and studied. The whole field of organic chemistry has been examined carefully, with the result that the scientific and patent literature is replete with descriptive documents, and the records of tests are voluminous. Small amounts of these substances (0.25% to 1.0% in terms of rubber) induce profound effects.

The proportion of sulfur has dropped from 16 2/3% (1900) to 2% or 3% and even as low as 0.5%. Indeed, some accelerators vulcanize rubber without any added sulfur: sulfur is available in their molecules. This decrease in sulfur has shown no money saving to the industry, even though when calculated as of 1937 some 25,000 tons less sulfur can be shown. The use of organic accelerators and antioxidants has increased the compound cost to the manufacturer, for prices range from 50 cents to $3.00 per pound. Less sulfur means better color in the finished article chiefly because it makes possible vulcanization at lower temperatures. Not so many years ago every rubber man expected each article to become covered, within a short time after vulcanization, by a grayish powder or "bloom" of sulfur. It was the excess sulfur then seemingly necessary to a uniform cure. Even some few non-blooming products were dull in color. Nowadays the majority of rubber compounds are so constructed and vulcanized that practically all sulfur used combines with rubber. Black tires remain black, and because of the wealth of lakes and dyes, especially synthesized for use in rubber compounds, a wide range of brilliantly colored articles has come into the markets.

Selected organic accelerators permit vulcanization to take place at almost any desired temperature from that of the refrigerator up to 200° C., and inversely as to time from a few seconds to hours, days, or months, as may be desired. Shorter time and lower temperatures for vulcanization are two of several benefits given by these organic substances. Plant capacities have expanded with consequent notable savings in investment. Then, again, improved and more uniform physical properties are acquired by the compound when these materials are used. The strengths may be much higher, and the compound may be heated longer without the bad effects of overcure. It is now possible to cure in a thin section or as a thick block, and the physical properties of center and surface and the life to be expected from both are essentially the same and of a higher order. Variable cures and irregular physical properties are gone due to these chemical discoveries.

The widespread practical applications of organic substances which are not accelerators of vulcanization and which, even in quantities as low as 1%, serve to stabilize the physical properties of vulcanized rubber during use or storage, are the direct results of research chemical activities of the past 20 years. Name them what you will—antioxidant, antideteriorant, antioxygen, age resister, anti-ager—they serve to maintain the desired and original physical properties of the vulcanized compound during a long life, and each is chosen because of its ability to do a specific service, such as resistance to decay from heat, storage, light, or for colored products. Some organic accelerators perform similar functions in addition to acceleration, but these stabilizing substances are currently used together with an accelerator. Consequently, rubber goods are more resistant to heat, to light (to a lesser degree, to be sure), to cracking when repeatedly flexed; in general, their life has been increased several fold.

Over forty different organic chemicals are marketed as accelerators, each of which possesses its own specific activity and utility, and fifty grades of antioxidants are on sale. No figures are possible to show the year by year use of organic accelerators and of antioxidants in the rubber industry, but a well known authority[2] has told me that in 1937 there were probably 7,500,000 pounds of antioxidants and 10,000,000 pounds of accelerators used in the United States.

The knowledge of organic accelerators and antioxidants has caused, during the last 20 years, a complete revision of almost all rubber compounds. Scarcely a single compound is in use today for any purpose which is the same in detail as that used 20 years ago. Thus, a veritable revolution in the practice of rubber compounding has occurred since 1918.

I shall not discuss the many other changes in the rubber compound brought about through research. Thousands of substances are in use which may be grouped into some ten divisions,[8] in addition to those analyzed above. Acceleration retarders (non-scorching agents), plasticizers, reinforcing pigments, odorants, blowing agents, abrasives are among the ones currently employed. The development of a formula or recipe for a rubber compound has changed from a hit and miss activity to a carefully controlled operation.

The Rubber Compound in Transportation

The wheel, of all mechanical inventions, did, and still does, perform the most profound service to civilization, and to the wheel the lowly rubber tire renders an essential service. Through mud, over rocks, at high speed or low, through hot desert or cool forest, city and country, the rubber tire silently and efficiently does its task. Its resistance to abrasive wear is one of the most outstanding developments of the modern age.

One authority[3] states that the crude rubber consumed by rolling transport amounts to 78.7% of the total and that used by pedestrian transport to 7.5%. But the tire


WITH THE LONG STRIDES OF RUBBER
St. Joe
IS RIGHT IN STEP
Rubber is now being used for purposes heretofore thought impossible. The scope of its application is constantly widening. Chemists, physicists and engineers predict so many new uses for rubber, that its consumption will continue to increase, providing as it does one of the most useful commodities of modern civilization.
Awake to the strides of rubber, this Company has equipped itself to provide the rubber industry with the highest quality zinc oxide; it maintains a highly efficient testing and research laboratory at the point of zinc oxide production. Here, a trained staff cooperates with the rubber industry in expanding the use, and consolidating the position of rubber as one of the world's most important materials of utility.
Produced by Our Patented Electro-Thermic Process
ST. JOSEPH LEAD CO.
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PLANT AND LABORATORY, JOSEPHTOWN, BEAVER COUNTY, PA.

is not the only form in which rubber finds employment in the automobile. The motor is supported upon blocks of rubber; doors and windshields are made water tight by rubber; bumpers, gaskets, windshield wipers—the list includes upwards of 175 separate rubber parts—each intended to add to the user's comfort.

Better crude rubber, more skilful manipulation, more scientific compounding and vulcanization all contribute to greater tire life. One other potent material of vital moment in the tread of a tire is the soot made from burning natural gas, which is the product called "carbon black" or "gas black." This substance has a powerful reinforcing effect in the compound. A composition consisting of 100 parts of crude rubber and, let us say, 48 parts of carbon black possesses a remarkable resistance to abrasive wear. This notable achievement was first made about 1912, and was introduced to the automobile tire industry in about 1915, but great strides have been made since those days. The black tread of 1937 is not at all that of 1915. In a private communication one authority[4] in the field of tire compounding has said that the roadwear index of the black tread automobile tire has increased since 1925 by 2 3/10 times. Moreover, in speaking of automobile tire values one should not overlook the displacement of square woven fabric by cord fabric. While the cord tire of 1918 ran on the average perhaps 8,000 miles, the one of 1937 may yield its spirit only after some 20 or 30 thousand miles. Indeed, there is no predictable mileage, because the life of a tire depends so much upon the speed with which it is driven, the care given to it, and other conditions of service. The average mileage of tires on the London bus is 60,000 miles. Recently a tire ran 150,000 miles.[5]

These high service records are due far more to the improved rubber compound than to any other attribute, and because tires are used by all industries—including chemical—and by all people—the economic changes ascribable to rubber compound improvement are vast indeed. Graphically, the rate of improvement in tires and its relative degree are seen in Table 1, wherein is indicated the Department of Commerce estimate of tire life in years. The rapidly mounting curve from 1917 upward is spectacular. It was in about that year that the organic accelerator, carbon black, and the cord tire entered the quality improvement race. Furthermore, 1918 and 1919 were the years in which research laboratories in the rubber industry stepped forth in rapid, scientific expansion.

An estimate of the economies given tire consumers, without any influence from competitive prices, may be worked out. The figures, columns 4 and 6, in Table 2 give the ratio of casings and tubes in each year to the total motor vehicles registered in that year, and thus indicate the annual tire consumption per car. The consumption of casings per car per year fell from 4.33 in 1919 to 1.86 in 1935, while tubes declined from 4.37 to 1.83. To these economies the engineer has contributed the cord tire, better production methods, the so-called "balloon" tire, and good roads. But the rubber chemist has more than kept pace with engineers in that his treads wear much longer and the rubber which binds the cords together, as well as the tubes, do not decay due to the heat and action of service.

Table 1

	Estimated Tire Life in Years		*Estimated Tire Life in Years*
1910	0.730	1924	1.570
1911	0.858	1925	1.581
1912	0.786	1926	1.770
1913	0.805	1927	1.655
1914	0.722	1928	1.550
1915	0.768	1929	1.848
1916	0.762	1930	2.465
1917	0.712	1931	2.417
1918	0.893	1932	2.689
1919	0.933	1933	2.427
1920	1.284	1934	2.566
1921	1.486	1935	2.725
1922	1.296	1936	2.692
1923	1.508		

Data taken from Circular No. 3644—June 15, 1937, Leather & Rubber Division—Dept. of Commerce.

An estimate of dollar saving because of these longer service values may be made when one calculates the number of casings and tubes which would have been used in 1935 had the same number of units per car been purchased in that year as in 1919. The cost per unit is based on the U. S. Census of Manufactures for 1935, in which year the casings possessed an average value of $6.61 and the tubes an average value of $0.93.

At the 1919 ratio of 4.33 casings per car, if no improvements had been introduced, 113,579,511 tires would have been required in 1935—a saving of 64,814,798 units. Tubes would have been 114,628,744—a saving of 66,868,065 units. At the above dollar averages per unit, the savings brought to the tire user, largely due to technical improvements, add to $491,909,409 for 1935 alone. This figure is free from competitive price reduction.

Table 2

Tires Sold—In Proportion to Motor Vehicles Registered

		Casings		*Tubes*	
	Vehicles Registered	*Sold*	*Ratio Casings per Vehicle*	*Sold*	*Ratio Tubes per Vehicle*
1919	7,565,446	32,835,509	4.33	33,225,410	4.37
1925	19,937,274	58,784,073	2.90	77,387,836	3.88
1927	23,133,243	63,549,949	2.74	70,855,455	3.06
1931	25,832,884	49,143,000	1.90	49,167,000	1.90
1935	26,230,834	48,764,713	1.86	47,760,679	1.83

Original data from United States Department of Commerce "The Census of Manufactures," Automobile Manufacturers Association, and Rubber Manufacturers Association.

The above figures may be called potential economies or savings. What has happened to the actual wholesale price of automobile tires is seen in the plot of Table 3. This decline in price may be ascribed to the chemist, the engineer, to the rubber planter, the production expert—but in chief to the force of drastic competition.

The farm tractor has become rubberized. The old all-metal tractor with steel wheels and without springs is disappearing. Pneumatic tires, large in size, with heavy ribs for better non-skid properties, are commonly in use. In some instances they are filled with a calcium chloride solution instead of air to lower the center of gravity and make lighter tractor weights possible, saving cost and gasoline.

A high speed caterpillar tractor has but recently come to the market. Instead of steel tracks, these new machines employ tracks made of wear resisting vulcanized rubber attached to steel cables. The result is a track laying tractor of unusually high speed and manoeuverability. Thirty miles per hour are possible. Fuel economy is great. It has the flexibility of the caterpillar and the speed of the truck.

The trolley car has been rubberized and silenced. After a long and careful research, rubber can replace steel springs. Wheels are insulated with rubber. Sponge rubber cushions are used in the seats, and all in all a vibration resisting, nearly noiseless trolley car has made its bow to the cities. Some people may believe that the trolley will disappear, but 640 of these so-called

Table 3

Wholesale Prices—Bureau of Labor Statistics

1926 = 100

Automobile tires (composite price), each, factory

	Index		*Index*
1918	229.2	1928	64.4
1919	209.2	1929	55.6
1920	232.5	1930	53.1
1921	179.0	1931	45.3
1922	115.4	1932	41.1
1923	109.5	1933	42.1
1924	92.6	1934	44.9
1925	98.6	1935	45.7
1926	100.0	1936	50.1
1927	76.3	1937*	55.6

* Average for eleven months.

noiseless street cars have been built, which indicates the activities of the Transit Research Corporation to retain the patronage of the 7,644,000,000 total paying passengers which it carried in 1936.

Rubber springs can be made for street cars and rubber supports used underneath the motors of the automobile, because chemists and engineers have been able so splendidly to improve the adhesion of rubber to steel. Before the War the adhesion of soft vulcanized rubber to metal, steel in particular, was of a low order. The interposition of a thin layer of hard rubber, if the steel had been copper plated, gave union of some consequence. Since 1918 research work has brought several methods for the adhesion of steel to rubber, some of which are considerably better than others, and a wide variety of new uses of rubber has sprung up. The most widely used material to bind vulcanized rubber to metal is a transformation product of rubber itself. This is a hard, tough, thermoplastic body made by heating rubber with certain organic acids. It is called Thermoprene, and is the basis of the Vulcalock process for adhering rubber to steel.

Airplane Transportation

Rubber in aviation has come to be essential. Comfort in taking off, flying and landing, and safety are made possible because of the several rubber parts used in the modern airplane. The large automobile tire is the most obvious rubber article when the passenger approaches the Mainliner or the Sky Sleeper, but not so easily seen are the rubber mountings to absorb the vibration of the tremendous motors; the instrument panels mounted on rubber; all radio equipment similarly mounted; and the rubber de-icer, which was developed to remove that major hazard, ice, which in years past was all too frequent a cause of airplane crashes.

Rubber in the Chemical Industries

In the application of the rubber compound to the chemical industries notable advances have been made during the past 20 years. Before the advent of the rubber compound as a means of lining tanks, pipes, and other equipment, corrosive chemicals, particularly acids, were transported in glass carboys and used in ceramic tanks or glass lined steel. Steel is obviously lighter, easier to manufacture into tanks of large capacity, but the ceramic linings were subject to breaking, chipping, and consequent corrosion and leaks. When the rubber chemist found a sure means of adhering vulcanized rubber to steel, a wide range of equipment lined with rubber became possible, and marked savings to the chemical industries were realized.

Coincident with the development of the means of adhesion has come more knowledge of how to mix various substances with rubber, what to use and how to vulcanize, so that the vulcanized rubber surfaces in contact with the substance to be conveyed have come to show a marked resistance to these chemicals. Steel tank cars[6] lined with rubber are operating today to the number of about 305. The average capacity of these cars is 7,500 gallons or approximately 75,000 pounds of muriatic acid. The cars make an average of one trip in 10 days, and, therefore, these cars transport 2,287,500 pounds of acid per day. The saving in the transportation of acid in rubber lined steel cars as compared with carboys amounts to about $20 per ton. Thus, savings for a year of 300 working days add up to $6,858,000, and in addition a number of processes have been revived because of the lower cost of handling this acid. Formerly muriatic acid could not be handled easily under pressure. Today rubber lined equipment makes pressure handling of muriatic acid almost as simple as that of water.

Another spectacular use for rubber lined tanks has been in the pickling of strip steel. The modern rolling

of strip steel has become fast, continuous, and economical because of the fact that acid tanks, sewers, fans, blowers, ventilators, etc., namely, all parts of the unit, have been lined by rubber. These are developments of the last 10 years. At the continuous hot rolling mills the strip leaves the last roll at the tremendous speed of 1,400 to 1,500 feet per minute, from which it is passed through the pickling unit to remove scale, thence to washing tanks and to the cold rolling mill. Since the pickling is the intermediate process between hot and cold rolling, it is extremely important that the apparatus in which the pickling is done be essentially leak-proof and that, therefore, there be no stoppage of the strip once it starts. Hot sulfuric acid, handled in these installations in large volume, is so corrosive that it is doubtful if modern speeds could be maintained continuously if any but rubber lined tanks were employed.

It would not be possible to list all details of construction nor all of the many uses to which rubber lined steel equipment has been put. It is fundamental to bear in mind that the function of rubber linings in chemical equipment is protective, that the equipment may be protected against corrosion and the contents from contamination. A rubber compound capable of withstanding contact with muriatic acid need not be, and probably is not, the best to withstand contact with sulfuric or phosphoric acids. The rubber compound must be designed for its specific use. For a number of years, pumps, pipes, pails and tank linings of hard rubber have been thoroughly standard chemical equipment.

Rubber Belting

Conveyer and transmission belts have been made from rubber for many years. Great improvements have been brought about, particularly in adapting experience from the use of automobile tires. Square woven fabric, although still used, is giving way to cord fabric, with consequent improvement in the power transmitted, service life, ease of handling, but it has been necessary to design special cords for special purposes. The adhesion between plies of fabric, as determined by the condition and quality of the rubber layer, has changed from around 18 pounds per inch of width to 35 or 40 pounds. The resistance of the surface to abrasive wear and in particular the design of the surface rubber to withstand different types of abrasion and different temperatures of the abrasive substances which the belt is designed to convey have been notable.

So far as the chemical industries are concerned, the application of the new knowledge of rubber compounding to boots and shoes lies in the creation of particular ones that resist chemicals, so that workmen may wear them under chemical conditions without danger.

Rubber Latex

Latex is the rubber milk, a suspension of fine particles of crude rubber in water and certain serum substances, the form in which the rubber first comes from the tree. Most rubber comes into this country dry and is the washed and dried product resulting from the treatment of latex with acid to coagulate and mass together these rubber particles. Some years ago various experimenters found that rubber articles formed directly from latex, mixed with vulcanizing ingredients, possessed properties not shown by compositions made from the usual dry crude rubber. Raw rubber before vulcanizing is softened by mastication and oxidation on rubber mixing mills, thereby losing some of its original physical properties. The rubber in the form of compounded latex is deposited upon forms which may be dipped into the latex, dried, and vulcanized. No mechanical working of the rubber has thus occurred.

Into liquid latex are dispersed in usually relatively small quantities the various vulcanizing ingredients. Numerous processes have been patented by which this rubber content, together with the vulcanizing ingredients, may be shaped into the form of desirable articles. The physical properties of the rubber goods made thus directly from latex are outstanding; and it is easy to handle it without expensive machinery, so that a notable increase in the use of latex during the past 10 years has resulted. Table 4 shows U. S. imports of rubber as latex. The volume has increased from 4,830,747 pounds as dry rubber to 51,934,040 pounds in 1937. The rubber content in latex as it comes from the tree is about 38% total solids, but it is now customary to concentrate it in the Far East to over 60%.

Surgeons' gloves are made by dipping forms in specially compounded liquid latex. They withstand repeated sterilization much better than those made by the old rubber cement method, and they may be made thinner, thereby more delicate for a surgeon's use. Rubber tubing, bathing caps, lightweight shoes, toy balloons, various kinds of molded goods are made from liquid latex with great improvement in quality. One of the outstanding developments has been the manufacture of rubber thread, and the product known as "Lastex" now has a world-wide reputation, and a large number of uses in which an elastic thread finds advantage. All rubber balloons capable of being inflated to many feet in diameter, but very thin and strong, are made from latex and used to carry instruments for the purpose of meteorological observations. Cans are sealed, paper is impregnated, and even the fabric of carpets and upholstery is economically held together by rubber from liquid latex. Sponge rubber

Table 4

United States Imports of Liquid Rubber Latex

	Pounds		*Pounds*
1924	4,830,747	1931	10,470,647
1925	7,329,440	1932	11,450,294
1926	7,603,125	1933	24,829,861
1927	3,347,964	1934	29,358,535
1928	8,975,579	1935	30,358,748
1929	8,354,767	1936	44,469,504
1930	9,985,550	1937	51,934,040

Data from Rubber Manufacturers Association.

cushions for trains, airplanes, and automobiles are made in some volume from compounded and frothed latex.

Mechanical Rubber Goods

The past 20 years have seen remarkable advances in the use of rubber as gaskets to insure air tight, water tight, and steam tight joints. It is used with asphalt for roads. Rubber printing rolls now displace the old soft gelatine rolls, and permit presses to run at much higher speeds. The dairy industry owes a tremendous debt to the rubber compound, because of the power milking machines made efficient because of the rubber milking inflations. Rubber as a means of insulating wire in electrical conductors is very old. The major advances during the past 20 years have to do with the adaptation of ingredients to improve insulating properties, greater uniformity of vulcanization, increase in strength, and in particular longer life.

Machine Supports

Noise and vibration are wasteful. It was unthinkable 20 years ago to support heavy machines upon rubber, because the rubber itself would break down too easily as well as separate from metal. It is not uncommon nowadays to support machines upwards of 100,000 pounds in weight upon rubber mountings; even though the horsepower is high and the period and amplitude of vibration large, and vibrograph records have shown a notable diminution of vibration. However, a large research and test program needs to be undertaken, and the engineer must wake up to the possibilities of rubber as an engineering material before the mechanical industries can derive the full value of the rubber compound.

Rubber Isomers and Derivatives

There are now available several molecular transformation products of rubber known as isomers, or as derivatives. Such a substance, used as a flexible paint and to adhere rubber to steel, is the isomer Thermoprene, previously mentioned.

A derivative of rubber on the market since about 1934 is the chlorine derivative known as Tornesite. It is of particular value in the protective coating field. It is non-inflammable, and inert chemically. It is also used in connection with paper coatings, etc. Although not large in consumption (about half a million pounds in 1937), it has a very definite place. Another rubber derivative, in this instance the hydrochloride Pliofilm, is finding wide use as a thin transparent film for raincoats, umbrellas, the wrapping of packages, etc.

So for 20 years the rubber industry has improved its compounds, has adapted them in shapes and sizes to an almost infinite variety of uses. It has brought about savings in money, in time, and gains in comfort. It has made possible articles of utility not previously dreamed of. It has changed the scope of industry. A remarkably varied association of substances is the rubber compound, and one wonders how it will change during the next 20 years.

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Industry's Bookshelf

Chemistry of Petroleum Derivatives by Carleton Ellis, Vol. II, Reinhold Pub. Co., N. Y., 1464 pp., $20.00. Continues and brings to date Vol. I. (1934), with additional material on asphalts, hydrocarbons, anaesthetics, and the synthesis of hydrocarbons from carbon monoxide with hydrogen: a typical Ellis work, monumental and exact.

The Revolution in Economics by Robert S. Hale, Bruce Humphries Co., Boston, 192 pp., $2.00. A lively examination of the exact meaning of common economic terms: a mental cocktail for any business thinker.

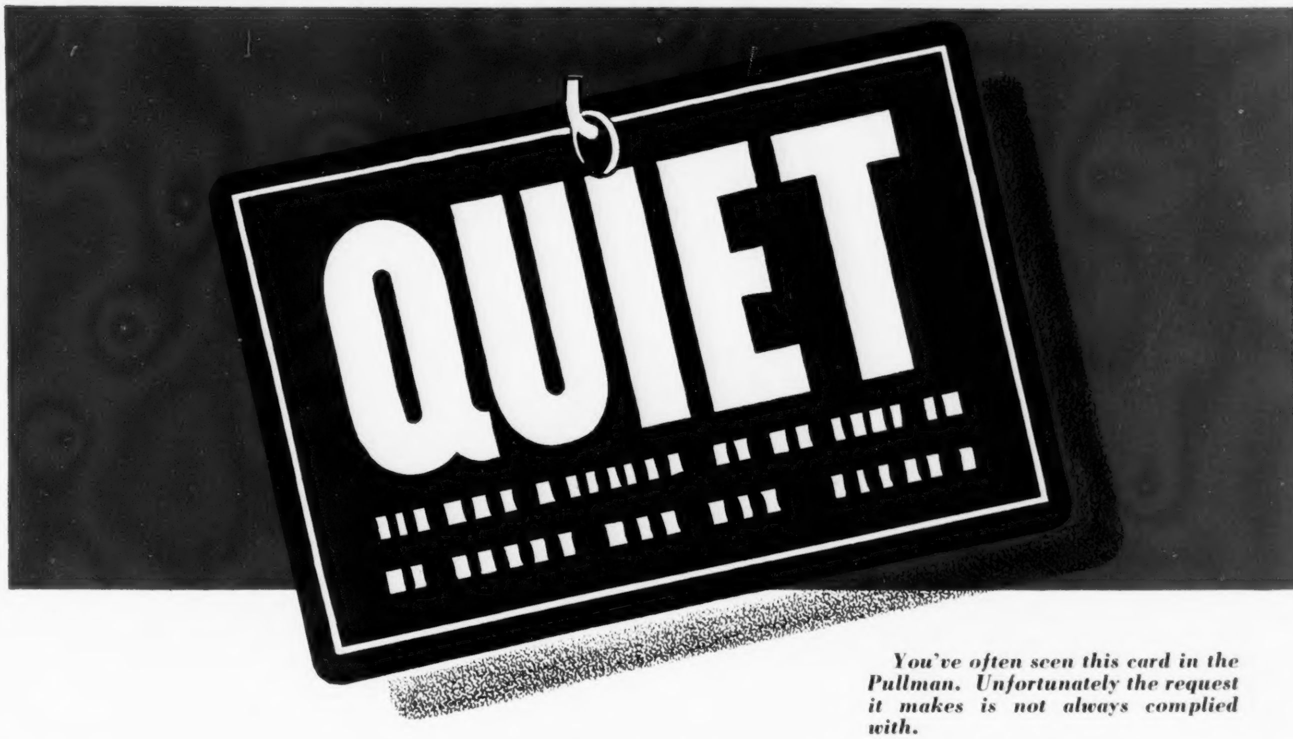
Newer Methods of Volumetric Analysis, W. Bottger, editor, translated by R. E. Oesper, Van Nostrand, N. Y., 268 pp. New methods and experience summarized by an expert chemical group with complete bibliography; an invaluable tool for commercial analysts.

Landmarks of Economic Thought by John M. Ferguson, Longmans Green, N. Y., 295 pp., (paper bound) $1.00. A clear, impartial, historical development of economic theory down to the uncertain and cross-current trends of today.

Colour Sensitive Materials by Robert M. Fanstone, Pitman Pub. Corp., N. Y., 127 pp., $3.00. Describes the various photographic films and plates, color filters, methods of developing and the processes of color photography.

Low Temperature Physics by M. & B. Ruhemann, Macmillan, N. Y., 313 pp., $5.00. First class introduction, not cast in rigid text book form, but a clear, well written exposition, on the one side of facts, the other of theory.

Latex and Rubber Derivatives and Their Industrial Applications by Frederick Marchionna, Volumes II & III, The Rubber Age, N. Y. C., 1700 pp., $20.00, with Vol. I, $30.00. These two volumes in the same general form and same painstaking manner, continue the initial volume on latex. The three make an exhaustive work on rubber and its uses.



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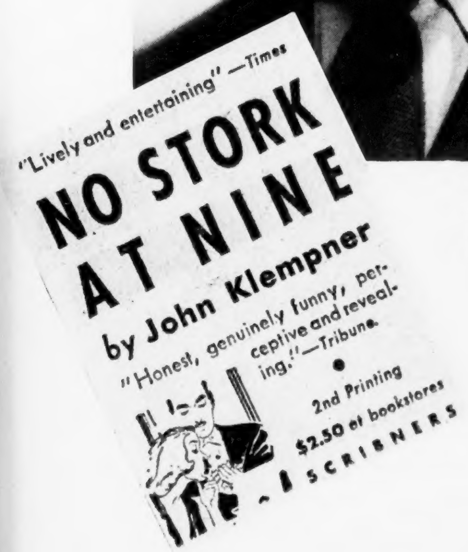
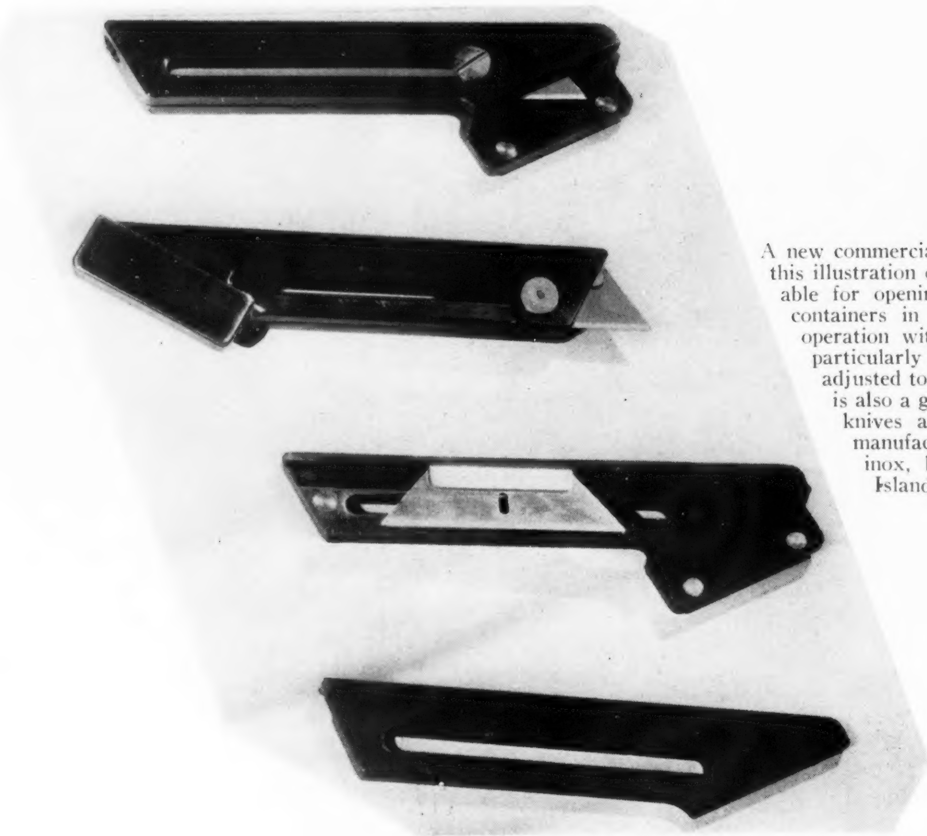


The author in our midst—John Klempner of Warner Chemical Company.

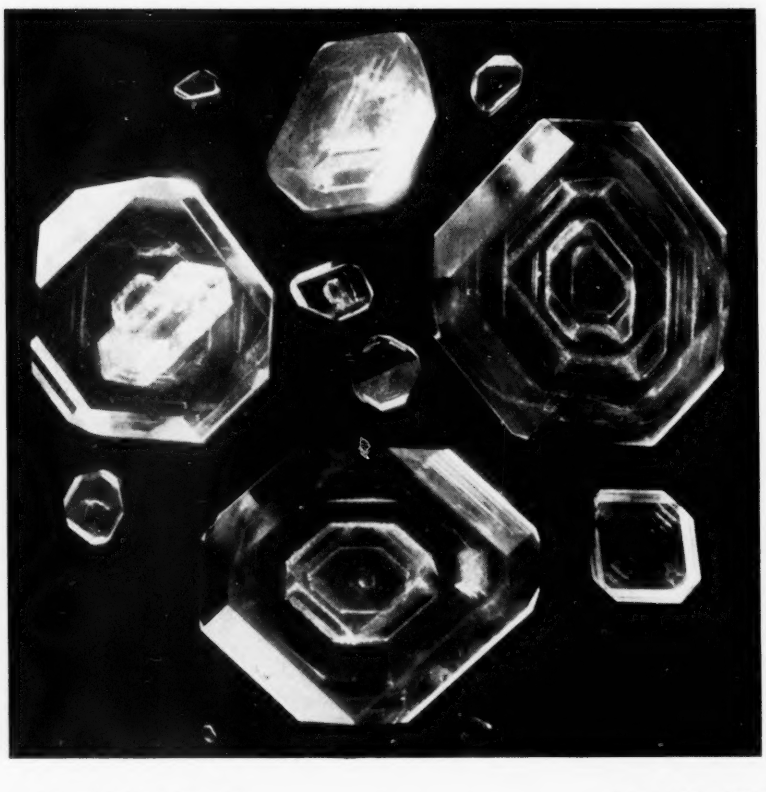
The occult science of numerology lives on—for the license plate number of Ellery L. Wilson, of the Rumford Chemical Works, specialists in phosphates, is P_2O_5—A. E. Marshall, cameraman.

Father's Day, June 19, makes especially appropriate the group below, fathers and sons who are carrying on the good old family tradition of the chemical industry, by working shoulder to shoulder together, at the Merrimac Plant, Everett, Mass., of the Monsanto Chemical Company.

Chemical Progress



A new commercial use for plastics is demonstrated in this illustration of a TU-WAY Cutter, especially suitable for opening corrugated, fibre, and cardboard containers in the chemical field, performing this operation without damage to contents. Blade is particularly adapted for this purpose, and can be adjusted to any cutting depth desired. TU-WAY is also a general utility tool which replaces dull knives and unguarded razor blades, and is manufactured of light-weight, durable Resinox, by the Morskill Company of Long Island City, N. Y.



Photograph of sulfamic acid large crystals, at approximately 1½ times magnification. Commercial production of this new inorganic acid having the form of a crystalline solid was announced recently by du Pont, see May issue, p. 550. Although identified about 60 years ago, it has never before been produced on a commercial scale because of lack of a practical process of manufacture. Because of unique physical and chemical properties, the acid and its derivatives are expected to be instrumental in improving processes and reducing costs in many industries. For example, one potential use of the acid, which is now being evaluated by the dye and pigment industries, is for removing excess nitrites following diazotization reactions.

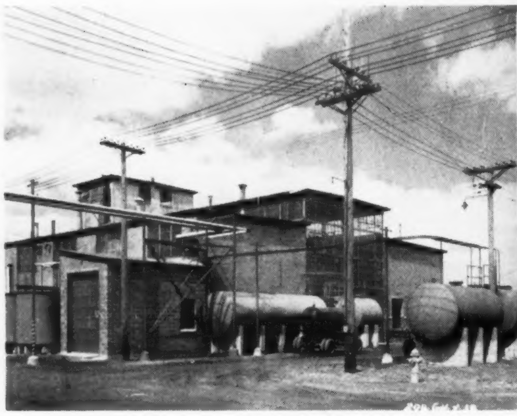
Recorded in Pictures

Corrosion specimens of human kidney, showing actual arteries in red color and veins in blue color made from acid-resistant Vinylite resins, product of Carbide & Carbon. Although corrosion specimens have been prepared since 1685, the injection experiments up to now have not been satisfactory. Effective results can now be obtained more rapidly by using a 12.5 per cent. solution of Vinylite resin in acetone. This is the most suitable concentration, because such a solution is not too thick to enter the finest branches of blood vessels and yet coagulate with sufficient speed after injection. Announcement of this development was published in our May issue, page 546.

A Lukenweld steel dryer, 6′ 0″ in diameter, with chromium-plated shell, recently designed and built by Lukenweld, Inc., Coatesville, Pa., for use in the paper, soap, pharmaceutical, textile, chemical and other industries. It operates with steam or other heating media, and is capable of providing steam distribution at pressures up to 150 lbs. In addition to its provision of controlled steam distribution, the dryer is also lighter in weight, and maintains a cleaner drying surface, gives more uniform drying, and lowers steam consumption. It can be made in all sizes up to 15 ft. in diameter.

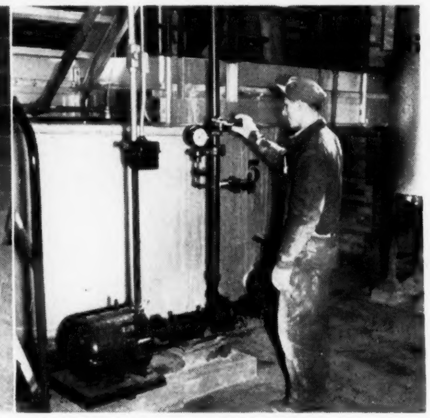
Behind the Dow-Thiokol Alliance

Dow to Make: Thiokol to Sell



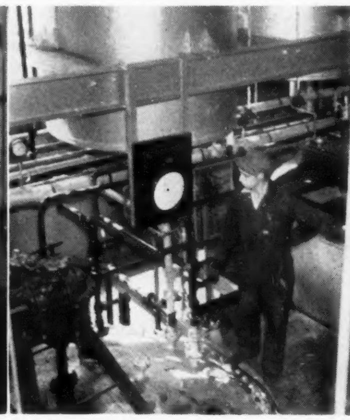
Dow has built this new plant at Midland, Mich., for the manufacture of Thiokol. At the left are the sodium polysulfide storage tanks, and at the right those for storing ethylene dichloride.

Dumping sulfur from buggy into elevator pit whence it goes into tanks where it is reacted with other materials to form sodium polysulfide.

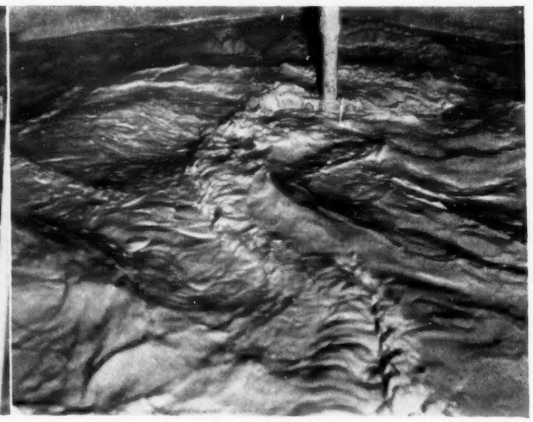


The sodium polysulfide is pumped from these make-up tanks (Number 5) through the filter tank (Number 6) to the outside storage tanks of the first photograph.

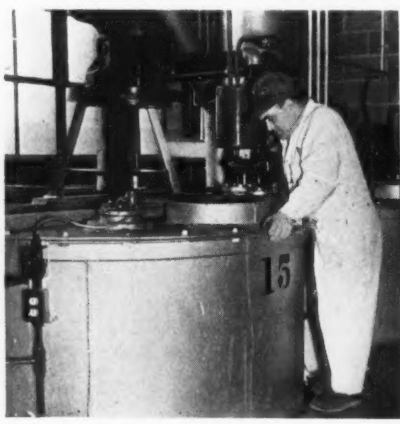
From outside storage tanks, the sodium polysulfide is pumped again into the building into the above reactor tanks.



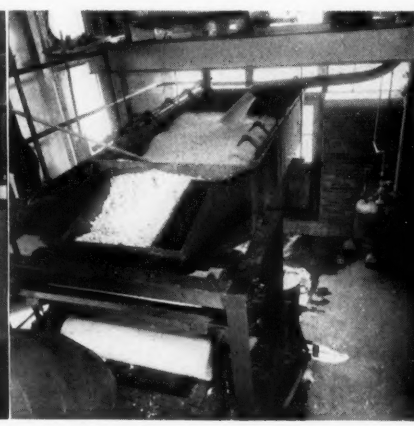
Carefully controlled quantities of ethylene dichloride are being released into the reactor tank where it reacts with the sodium polysulfide and ethylene dichloride.



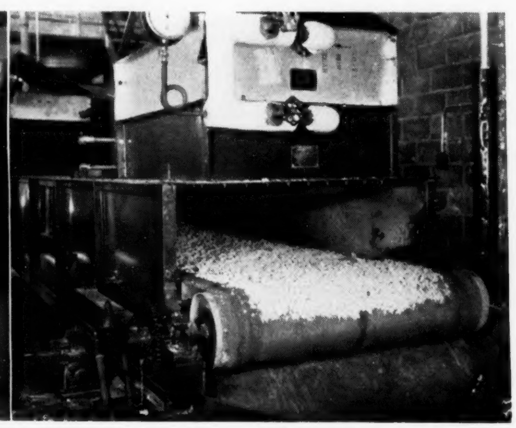
Synthetic rubber latex, Thiokol, shown inside the reactor tank as it is produced from carefully controlled chemical reactions carried on as shown in the last three pictures.



After washing the latex is coagulated by the addition of acid in Tank 15, where the rate of reaction is controlled to get the best particle size.

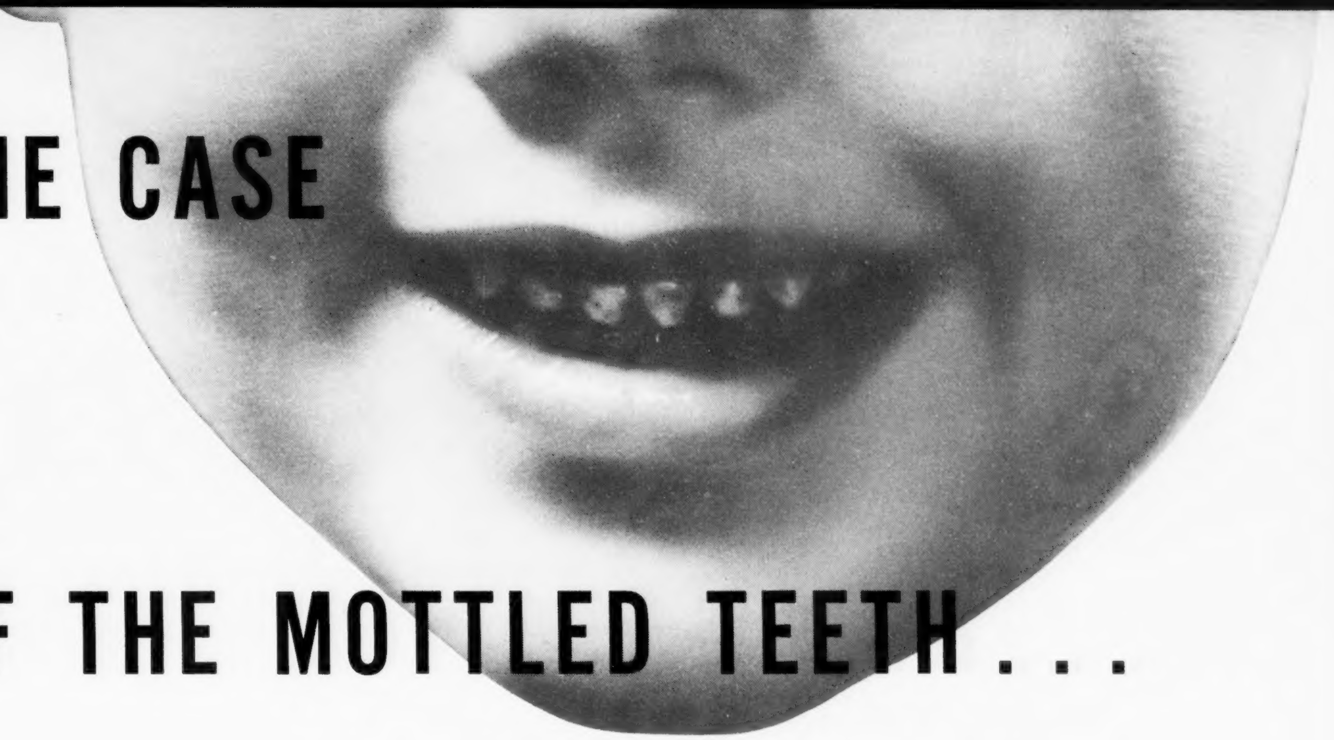


At this point, the coagulated latex is being discharged into a filter box for washing and draining, and then passed to the squeeze rolls shown at the near end of the drier.



View of the other end of the drier with the finished Thiokol, synthetic rubber, being discharged off the continuous belt and thence to the packing room and shipping platform.

THE CASE OF THE MOTTLED TEETH . . .



New and unexpected uses for phosphates are constantly being created. Never was this more dramatically emphasized than in the "case of the mottled teeth."

For many years children living in certain midwestern communities were afflicted with an unhealthy mottling and rapid decay of the teeth. The cause was finally traced to excessive amounts of fluorine to be found in the drinking water.

Many attempts were made to purify the water, but without success. Apparently, the only alternative was to find a new source of pure water, and this in many instances was either impossible or exorbitantly expensive.

The problem came to the attention of Victor research chemists who discovered that by simply filtering the contaminated water through a bed of tri-calcium phosphate, the fluorine content could be reduced to less than 3/10 parts per million --- an amount which is normally considered unobjectionable.

While we do not by any means regard the salts of phosphoric acid as a panacea for all problems, they do have many unexpected highly desirable applications. Our research department will gladly determine whether a "tailor made" phosphate will solve a problem for you.

VICTOR CHEMICAL WORKS

141 W. Jackson Blvd., Chicago, Ill.

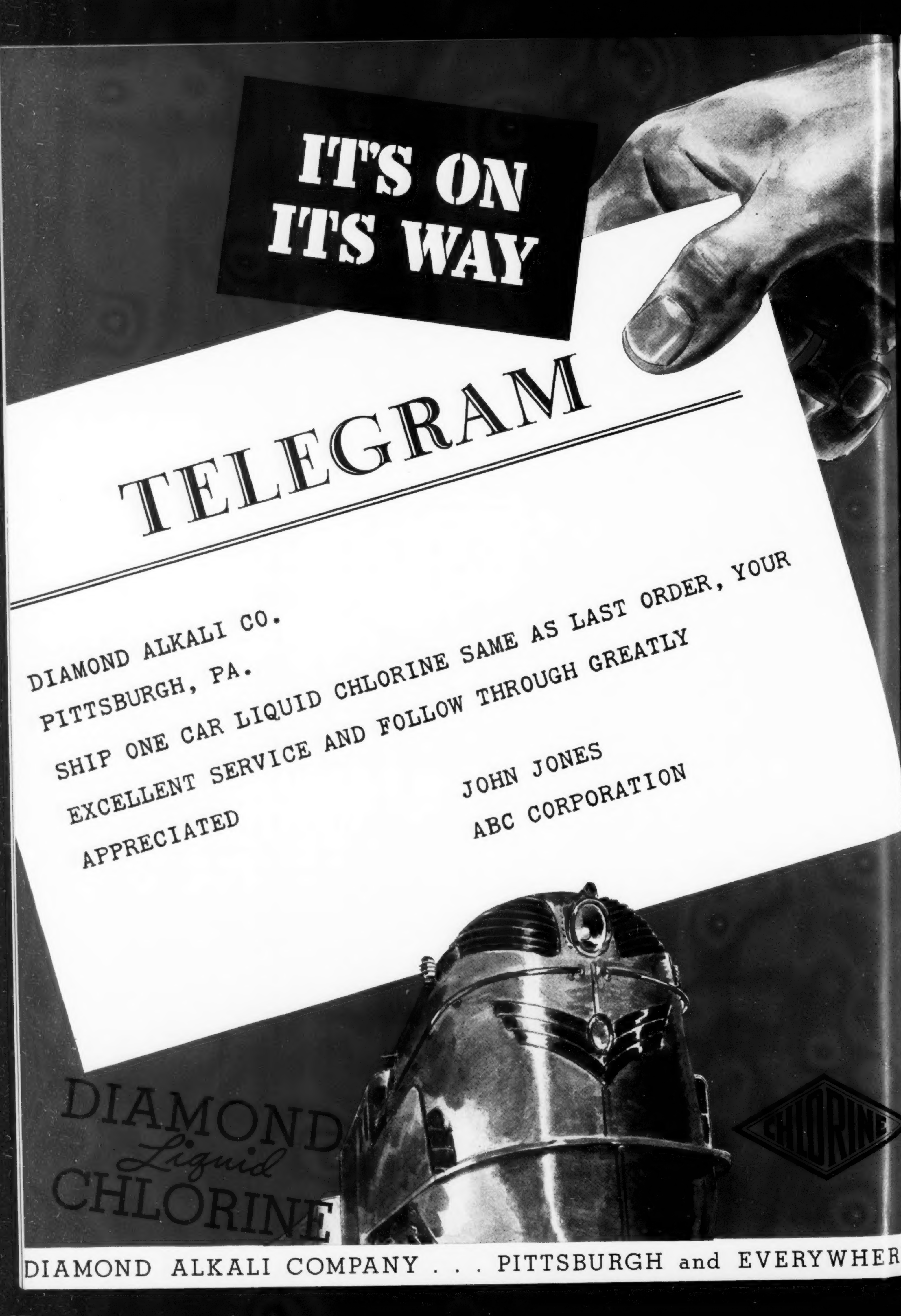
Plants: Nashville, Tennessee; Mt. Pleasant, Tennessee; Chicago Heights, Illinois

Offices: New York, N. Y.; Nashville, Tennessee; Kansas City, Missouri; Greensboro, North Carolina

VICTOR

FAMOUS FOR PHOSPHATES

HEADQUARTERS FOR PHOSPHORUS . . . PHOSPHORIC ACID . . .
AND PHOSPHATES OF ALL KINDS


IT'S ON ITS WAY
TELEGRAM
DIAMOND ALKALI CO.
PITTSBURGH, PA.
SHIP ONE CAR LIQUID CHLORINE SAME AS LAST ORDER, YOUR
EXCELLENT SERVICE AND FOLLOW THROUGH GREATLY
APPRECIATED
JOHN JONES
ABC CORPORATION
DIAMOND Liquid CHLORINE
CHLORINE
DIAMOND ALKALI COMPANY . . . PITTSBURGH and EVERYWHERE

Plant Operation and Management

A digest of new methods and plant equipment

Electrolytic Production of Ammonium-Nitrate

A METHOD of ammonium-nitrate production that has been examined by a group of Russian chemists holds promise of supplying one answer at least to the problem of finding economic outlets for the surplus oxygen produced in the electrolytic manufacture of hydrogen. New process, which is described by Kobozew and his co-workers (*Jour. Chem. Ind. Russ.*, 1937, No. 19), is virtually a partial oxidation of ammonia by water, carried on to the stage of ammonium-nitrate production, the three reactions involved being summarized by the following equations:

$$\begin{aligned} 4H_2O &= 4H_2 + 2O_2 \\ NH_3 + 2O_2 &= HNO_3 + H_2O \\ HNO_3 + NH_3 &= NH_4NO_3 \\ \hline 2NH_3 + 4H_2O &= NH_4NO_3 + 4H_2 + H_2O \end{aligned}$$

As the energy consumption of the combined reactions has been calculated to be equal to 0.72 volts, while the decomposition voltage of water is 1.23, the thermodynamic data indicate that by the interaction described, the decomposition potential of water can be decreased in principle, to 0.5 volts.

Russian Research Results

The electrolyzer described consists of a rectangular wooden vessel with an asbestos or clay diaphragm and an anode of iron. As electrolyte, 16 per cent. ammonium-carbonate solution or a 10 per cent. potassium-hydroxide solution has been used; while to increase the yield, employment is made of a special catalyst (principally copper hydroxide) made by the interaction of copper sulfate and ammonium carbonate. The electrolyte is preferably kept in motion during the process, ammonia gas being led in during the water decomposition. Analysis of the gases evolved show that carbon dioxide is formed in the liquid and that ammonium carbonate is, in all cases, probably the actual electrolyte. The yield of ammonium nitrate has been found to depend upon the following factors:

(1) Time of operation—The maximum yield is reached after five to six hours after which rapid decrease occurs, probably owing to the formation of ammonium bicarbonate which precipitates and eventually brings the process to a standstill. Yields of as high as 96 per cent. of the theoretical have been obtained, but the average figure has been in the neighborhood of 75 per cent.

(2) Hydrogen ion concentration of the electrolyte—The best results have been obtained at a pH of 8.5—8.4. At neutrality point (pH = 7.07) 92 per cent. of the oxygen produced escapes unutilized, while in alkaline solution the action does not take place at all. The necessary acidity can be maintained by the addition of nitric acid.

(3) Current density—No great differences in yield have been noted at current densities ranging from 0.0025 to 0.04 amperes per square cm.

(4) Catalyst concentration—An addition of 0.9 to 1.0 per cent. of catalyst is preferable. In certain circumstances, the catalyst quantity can be increased, but should never be more than 6 per cent., since at this latter concentration the equilibrium is shifted.

(5) Anode material—Iron, copper, nickel and lead peroxide have been tried, but the best results were obtained with an iron cathode.

Power Consumption Figures

Working by a continuous method the experimental results have shown that solutions containing 74 per cent. and over of ammonium nitrate can be obtained when employing a voltage of 2.8, a current strength of 45 amperes, a current density of 750 amperes per square meter, and a temperature of 20-25° C. From the results it is calculated that by the use of 6,670 kwh., 776 kilogs of ammonium nitrate and 1,000 cubic meters of hydrogen can be obtained. In ordinary water electrolysis, a power consumption of approximately 5,000 kwh. is required per 1,000 cubic meters of hydrogen, so that the production of one ton of ammonium nitrate requires only some 2,000 kwh. The ammonium nitrate obtained is stated to be fairly pure, though it may be contaminated with up to 0.2 per cent. of iron derived from the anode. (*Chemical Trade Journal*, May 6, '38, p. 375).

Changes in Benzene on Intensive Drying

Since H. B. Baker from 1912 reported rises in boiling point, surface tension and freezing point in the case of liquids intensively dried by phosphorus pentoxide, the problem has been investigated by others, who have mostly either failed to observe any change in physical properties or have explained the effects as due to superheating. D. A. Lacoss and A. W. C. Menzies (*J. Amer. Chem. Soc.*, 59, 2676; 1937) now find that when purified benzene is desiccated with purified phosphorus pentoxide with precautions to exclude or destroy dust, its vapor pressure, near 80°, is lowered markedly if the drying process is carried on at room temperature, but raised slightly if the drying is carried on at 90° or 105°. Without opening the sealed apparatus, the vapor pressure could be caused to revert to the normal value by heating the liquid out of contact with the phosphorus pentoxide, provided the desiccation had not been too vigorous. On allowing access of normal air, vapor pressures likewise reverted to the normal value. No change in vapor pressure was found in the case of benzene if the materials used were not both purified and also dust-free, nor when barium oxide or magnesium perchlorate were used as desiccants. Carbon tetrachloride, normal heptane and cyclohexane failed to show any change of vapor pressure upon desiccation under the same conditions as had given positive results with benzene (*Nature*).

Crotonaldehyde Production

Crotonaldehyde is made by introducing aldol into a boiling aqueous solution of a salt at pH 2—7 which has a buffering action within that range, the solution being of sufficient concentration to have a dehydrating effect, according to E. P. 477,660 (*Chemical Trade Journal*, Apr. 1, '38, p. 276). The distillate separates into crotonaldehyde and water layers. The invention is described with reference to examples of the use of primary sodium phosphate, primary and secondary sodium phosphates, potassium bifluoride and sodium acetate, respectively. In the last example, the aldol solution fed in is at pH 3.5.

Research on Maleic Acid

Production of maleic acid by the vapor phase catalytic oxidation of benzene with yields approaching 85 per cent. of the theoretical is claimed by Kiprjanow and Chostak (*J. Appl. Chem. Russ.*, 471, 1938). The authors use a catalyst consisting of 70 per cent. V_2O_5 and 30 per cent. MoO_3, to which 5 per cent. cobalt oxide is also added. The oxidation is effected in two chambers in series, the reaction temperature being maintained closely at 400-450° C. The benzene-vapor air mixture entering the first chamber is in the ratio of 1 to 60 and is preheated, while the gas-speed through the chambers is 5 litres per minute. The reaction chambers themselves are flat vessels (150x100x15 mm.), made of iron, the catalyst being supported on a layer of pumice, the pumice particles having a diameter of 2 to 2.5 mm. (It is understood that processes hitherto tried for the conversion of benzene into maleic acid have not given yields higher than 60 per cent.).

Chromic Acid Purification

A solution of chromic acid produced electrolytically is freed from iron by adding ammonia to produce ammonium bichromate; ammonia is then driven off by means of lime forming calcium bichromate from which calcium sulfate is precipitated by addition of sulfuric acid to leave pure chromic acid. E. P. 477,381, mentioned in *Chemical Trade Journal,* Apr. 1, '38, p. 276.

Purifying Caustic-Alkali Solutions

Silicon compounds are removed from aqueous solutions of alkali metal hydroxides containing up to 45-50 per cent. alkali metal hydroxide, by digesting the solution with a mixture of two or more reagents, at least one reagent being selected from each of the following groups: (a) the group consisting of the hydrated oxides, hydroxides and salts of trivalent iron, including the salts of acids derived from ferric oxide, *e.g.*, sodium ferrite; (b) the group consisting of the oxide, hydroxide, and salts of calcium, the reagents being added in either order or simultaneously and in sufficient quantity to precipitate a substantial proportion of the silica, the quantity or iron compound (reckoned as Fe_2O_3) being about 1-3 mols. or more for each mol. of silica which it is desired to remove. In this process, which is the subject of E. P. 475,937 (*Chemical Trade Journal*, Mar. 18, '38), it states that suitable iron salts are ferric chloride or sulfate. The trivalent iron compound may be formed in situ by the oxidation of a divalent iron compound. The calcium compound may be calcium hydroxide or carbonate, and may be initially present in the alkali hydroxide solution as a slurry obtained in a previous lime causticizing process. Calcium sulfate, chloride, nitrate or nitrite are also suitable. The digestion is preferably conducted at elevated temperature, *e.g.*, 100° C., and the solution treated is preferably relatively dilute, *e.g.*, a 10 per cent. solution. Aluminum and manganese compounds are also removed by the treatment to some extent, the removal of aluminum depending on the presence of silica.

Determination Ethylene Glycol

A new, convenient method for determination of ethylene glycol is described by Dr. R. Cuthill and Dr. C. Atkins, Bradford Technical College, in *The Analyst*, April, '38. A mixture of 50 cc. of 0.1 N potassium permanganate solution, 10 cc. of approximately 0.025 M glycol solution, and 30 cc. of 4 N sodium hydroxide solution is allowed to stand for 1½ hours, after which 50 cc. of 4 N sulfuric acid are added, and the mixture is allowed to stand for another hour. Finally, 10 cc. of 10 per cent. potassium iodide solution are added, and the iodine liberated is titrated with thiosulfate. Under these conditions glycol reacts with 5 atoms of oxygen, corresponding with complete oxidation to carbon dioxide and water. It is necessary, also, to make a blank experiment, omitting the glycol. The method gives good results over a wide range of glycol concentrations.

Red Lead Rotary-furnace Process

A continuous rotary-furnace process for the manufacture of red lead from the lower oxides or from white lead is claimed in E.P. 476,238 of 1936 (*Chemical Trade Journal*, Jan. 7, '38, p. 6). Advantages claimed are that continuous feeding of the raw material into the rotary furnace can be effected by means of enclosed conveyers, and that the rotary furnace may be lined with fire-resisting material whereby plant maintenance costs are considerably reduced.

Synthetic Vanillin

Among the methods for synthesis of vanillin from guaiacol, that depending upon treatment of guaiacol with formaldehyde and para-nitroso-dimethylaniline has been known for some time. It has, apparently, never reached the commercial scale owing to necessity for use of a large excess of formaldehyde and consequent danger of tar formation by the formic acid produced. The Russian chemist, Wolynkin (*J. Appl. Chem. Russ.*, 423, 1938), has found that part of the formaldehyde can advantageously be replaced by a metal, aluminum being particularly suitable. Using this modification, the synthesis can be effected without the necessity for cooling below zero and the yield can be increased. It has also been found that the aluminum acts to some extent as a catalyst promoting the selection by the aldehyde group of the para position to the hydroxy group. The synthesis, also covered in Russian Pat. No. 50,437, is effected as follows: Guaiacol (12 parts) and 40 per cent. formalin (7.5 parts) are mixed and treated with 3.0 parts finely-divided aluminum. A suspension of para-nitroso-dimethylaniline hydrochloride in 400 parts dilute hydrochloric acid and about 60 parts 90 per cent. alcohol is made in a porcelain vessel, and the first mixture added to this suspension, while vigorously stirring, at a temperature of about 50° C. Agitation is continued for about four hours at about 40° C. The crude vanillin produced can be purified by submitting it to pressure inside a steel container.

Sodium Silicate Solutions

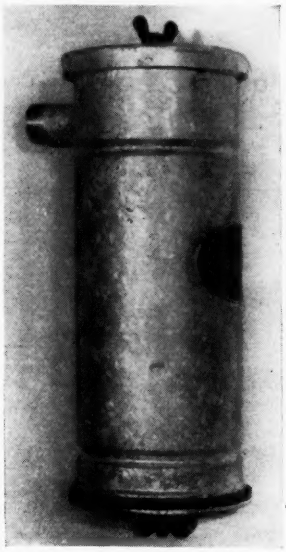
At a meeting of the South-West German Chemical Lecturers' Ass'n, a paper on the "Solution of Solid Sodium Silicate in Water," by W. J. Müller, W. Machu, and W. Stidl, of Vienna, was presented. In usual technical practice, it was pointed out, waterglass solutions are made by treatment of the solid product, as produced in the furnace, with water at 150-170° C., under pressure. Experiments on the influence of the temperature have shown, however, that even at lower temperatures the material is soluble in water in comparatively short time, but that a part always remains undissolved.

Attention was then directed to the influence of the ratio of the quantities of solid silicate and water utilized, and it was found that with increasing quantities of the former, not only did the concentration of the solution obtained increase, but that the time necessary to reach a high concentration in solution was very much reduced. With large quantities of the solid again, the influence of temperature became subsidiary, and it was possible to obtain solutions containing up to 60 per cent. of sodium silicate at lower temperatures. If a large excess (for instance, 200 grammes of solid sodium silicate to 100 grammes of water) is used, solutions of technical concentrations can be obtained in a comparatively short time at temperatures of 100° C., that is, without pressure. Under these conditions, the ratio $SiO_2:Na_2O$ in the dissolved material is identical with that in the solid. Process can be carried out continuously, while the solutions obtained have been found to possess a lower viscosity than those of the same concentration made at high pressures and with less solid waterglass. Minimization of hydrolytic phenomena, when working with large quantities of the solid silicates, is offered as the explanation of the efficiency of the method which, it is stated, is covered in Austrian Patent 140,554 and D.R.P. 628,556. (*Chemical Trade Journal*).

New Equipment

Desiccating Breather

The Actigel Desiccating Breather, new development of Acticarbone Corp., 62 E. 42nd St., New York City, has been designed as an industrial companion for the widely used Actigel Perpetual Desiccator for laboratory use. New appliance is said to provide positive insurance against moisture absorption by hygroscopic materials held in storage tanks and other receptacles. The breather is attached to vent lines and all air inspired due to cooling or partial emptying is completely dehydrated in passing through it into the receptacle. It has found wide use in the electrical field. Enclosed motors, starters, transformers and similar apparatus are said to be protected from the danger of accumulated moisture. The breather has no moving parts and lasts almost indefinitely. Regeneration is easily carried out and is necessary only about once a year.



Multiple Zone Humidity Controller

A multiple zone control unit for dry kiln operation, which automatically provides even heat and humidity over the entire kiln length, has been introduced by Foxboro Co., Foxboro, Mass. Essentially a Triplex Controller, unit has three bulbs, three complete thermal systems, three set pointers and three control heads. It is particularly adapted for long kilns, providing individual temperature control at each end of the kiln by two separate dry bulb systems; the third, or wet bulb, is used for humidity control of the entire kiln. All three temperatures are recorded continuously on one chart.

Detonating Cap

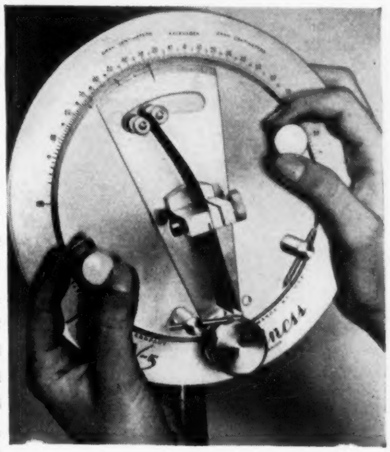
A marked advance in safety for all users of explosives has been made by Atlas Powder Co., Wilmington, Del., who have just announced development of Atlas Manasite Blasting Caps and Electric Blasting Caps. The new Manasite Detonators, claimed to substantially increase the margin of safety in handling explosives, contain a new initiating compound, chemically called hexanitromannite. As used in these new detonators, this compound is much less sensitive to impact and friction than detonating compounds commonly used.

Hopper-type Barrel Plating Equipment

Automatic handling of barrel plating work is now commercially practical by use of simple, inexpensive hopper equipment designed by Hanson-Van Winkle-Munning, Matawan, N. J. The purpose of this type of operation is lower production cost; proper control of treatments; large production capacity in small floor space; low maintenance cost; segregation of various classes or small batches of work without confusion; in general, improved and more effective treatment of work than is possible with dipping baskets. Several different designs of hoppers are in use, depending upon size of articles and shape of the bottom best suited for rinsing and treatment of the work.

Stiffness Gauge

The Taber V-5 Stiffness Gauge and Triple-Cut Shear, for measurement of stiffness and resilient qualities of paper, coated fabrics, light metallic sheet and wire, are announced by Taber Instrument Co., No. Tonawanda, N. Y. The latter is an important accessory to the V-5 Gauge as it blanks out test specimens accurate to size, insuring against dimensional errors associated with single shears. Both units are light and portable and can be used anywhere, in the laboratory, office or plant. The gauge's simplicity of operation and quick direct readings make it easy to use, even by those without previous technical experience. Features: Metric calibration with continuous scale from 0-2,000 gram centimeters; advanced design, rugged construction; no delicate parts, electrical contacts or connections.

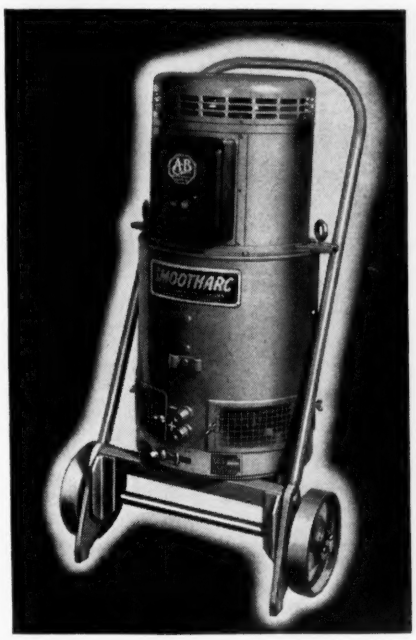


Compressor Unit Delivers Dry Air

A portable air compressor unit delivering bone-dry air, is announced by Acticarbone Corp., 62 E. 42nd St., New York City. Dry air is produced by an Actigel desiccating unit built on the compressor discharge. It has no moving parts and requires attention at very infrequent intervals. It is claimed that in general it need not be touched in less than three to six months of actual service. This improved apparatus should find wide use in many fields where dry air for spraying and drying is found beneficial.

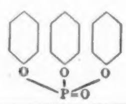
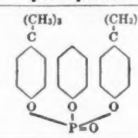
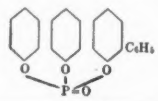
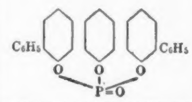
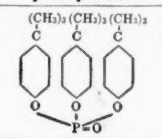
Vertical Type Welder

Designed to occupy a minimum of floor space, a new 150 ampere Vertical P & H-Hansen Welder, announced by Harnischfeger Corp. of Milwaukee, is said to be adaptable for a wide range of work in welding lighter gauge metals, both ferrous and non-ferrous. With plug-in type cable receptacles for easy current reversing, and patented, single-current control, it sets a new high point in simplicity of welder operation. It is designed for high current uniformity, and is an ideal unit for use in the production welding line where smooth, uniform welds are essential. Furnished in the A.C. drive only, machine is less than 4 ft. in overall height. An ingenious towing handle provides easy movement around the shop, and ample stability when raised to form a 3-point base.



No. 3

This is the third of a series of advertisements announcing a new list of products for which DOW has developed new processes of manufacture. The DOW Chemical Company invites inquiries from organizations interested in these products. Copies of previous advertisements will be furnished upon request.

Product	**Triphenyl phosphate**	**Plasticizer 2**	**Plasticizer 5**	**Plasticizer 6**	**Plasticizer 7**
Synonym		**Di-p-tert-butylphenyl monophenyl phosphate**	**Diphenyl mono-o-xenyl phosphate**	**Di-o-xenyl monophenyl phosphate**	**Tri-p-tert-butylphenyl phosphate**
Formula					
Molecular Weight	326	438	402	478	494
Properties	White, odorless, crystalline powder	Clear, colorless, odorless, viscous, permanent liquid.*	Clear, colorless, odorless, mobile liquid.*	Clear, almost colorless, viscous liquid.*	White, odorless, crystalline powder.
Specific Gravity at 60/4° C.	1.20	1.08	1.20	1.20	—
Lbs./Gal. at 25° C.	—	9.3	10.3	10.3	—
Boiling Point at 5 mm. Hg.	220° C.	260-275° C.	250-285° C.	285-330° C.	320° C.
Pour Point	—	—10 to 0° C.	—15 to —4° C.	+13 to +18° C.	—
Melting Point	49.9° C.	—	—	—	103-105° C.
Flash Point	225° C.	250° C.	225° C.	250° C.	275° C.
Fire Point	305° C.	>400° C.	>400°C.	>400°C.	>400° C.
Viscosity at 60°C. Centipoises	8.3	35-45	30-55	170-200	—
Refractive Index at 60°C.	1.552	1.525-1.528	1.582-1.590	1.603-1.605	—
Solubility at 25° C. Grams per 100 grams of solvent:					
n-Butanol	115	∞	∞	∞	30
n-Butyl acetate	150	∞	∞	∞	75
Ethanol	155	∞	∞	∞	25
Ethyl acetate	195	∞	∞	∞	75
Ethylene dichloride	155	∞	∞	∞	90
Toluene	200	∞	∞	∞	115
Troluoil	7	∞	8	2	15
Recommended as plasticizers for	Cellulose acetate Cellulose mixed esters Nitrocellulose	Cellulose mixed esters Ethyl cellulose Nitrocellulose Polystyrene	Cellulose ethers Cellulose mixed esters Nitrocellulose Polyvinyl esters	Cellulose ethers Cellulose mixed esters Nitrocellulose Polystyrene Polyvinyl esters	Benzylcellulose Cellulose aceto-propionate Ethylcellulose Polyvinyl esters

*Having substantially the composition indicated by the formula.

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Alnico Limit Switch, a snap-action, single-pole, double-throw switch with two independent circuits; Bulletin GEA-2907, on type CR9440-B1B, features and application data. General Electric Co., Schenectady, N. Y.
Alternating-Current Arc Welders. Bulletin GEA-1750D, on type WK, tells briefly where such equipment can be most profitably applied; ratings, weights, and dimensions. General Electric Co., Schenectady, N. Y.
Asbestos Protected. Bulletin, method used in insulating and winding U. S. motors. U. S. Electrical Motors, 200 E. Slauson ave., Los Angeles, Calif.
Autostart Grinder. Bulletin, enumerates and illustrates various features of Autostart grinders and buffers. U. S. Electrical Motors, 200 E. Slauson ave., Los Angeles, Calif.
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Clean Diesel Oil—By Sharples. Booklet, informative synopsis on use of properly applied centrifugal force to the purification of fuel and lubricating oils, and the practical economies effected by this modern application; also important part it plays in minimizing forced shut-downs. Sharples Specialty Co., 23d & Westmoreland sts., Phila., Pa.
Consolidated News, May, 1938, house organ for this dealer in used machinery, lists available equipment of all descriptions and for all industries. Consolidated Products Co., 15 Park Row Bldg., N. Y. City.
Corrugated Type Expansion Joints. Bulletin No. 200, illustrates and briefly describes various packless expansion joints, their history, improvements as developed by company's engineers, uses, prices, dimensions, and weights. E. B. Badger & Sons Co., Boston, Mass.
D-C Magnetic Crane Control, for hoist, bridge, trolley and auxiliary motions, Bulletin GEA-2292A, on types CR4422 and CR4426, descriptions and ratings, also data derived from exhaustive tests of the hoist control. General Electric Co., Schenectady, N. Y.
Despatch Cross Flow Forced Draft Ovens, electric or gas heated, leaflet, features new 1938 units which have unusual interior uniformity, close temperature control, and are said to reduce processing time required for drying and similar tests by one-half, condensed specifications. Despatch Oven Co., 622-9 st., S. E., Minneapolis, Minn.
Diglycol Stearate. Leaflet, price schedules, mentioning properties and uses. Glyco Products Co., 146 Lafayette st., N. Y. City.
End Suction Centrifugal Pumps. Bulletin No. 7069, on style CRV, built in capacities up to 1,000 gals. per min. for heads up to 500 ft.; photos, complete tables of performances and dimensions; explanations for selection of proper size pump. Ingersoll-Rand Co., Cameron Pump Division, 11 B'way, N. Y. City.
Fisher's Titrimeter. Folder, explains theory and operation of this all-purpose electrometric titration apparatus for volumetric analysis; illustrations and prices. Fisher Scientific Co., 711 Forbes st., Pittsburgh, Pa.
Flexo Wax C. Leaflet, properties, uses and price schedule of this substitute for ceresin and beeswax. Glyco Products Co., 146 Lafayette st., N. Y. City.
Float Switches, for use with automatic pumping equipments for water-level control, Bulletin GEA-67E, on type CR2931, descriptions and standard forms. General Electric Co., Schenectady, N. Y.
Foamex. Leaflet, uses, descriptions, and prices of new foam-reducing compound. Glyco Products Co., 146 Lafayette st., N. Y. City.
For Greater Safety. Circular, shows many ways of introducing safety in indoor transportation of materials, helping to eliminate minor as well as major injuries. Lewis-Shepard Co., 280 Walnut st., Watertown, Mass.
Gorton High Pressure Air Eliminator, for quick and automatic venting of dryers, steam coils and mains, unit heaters, laundry and processing equipment, etc., leaflet, specifications, prices, and description. Gorton Heating Co., Cranford, N. J.
Herco Thermometers. Bulletin No. 230, lists company's line for different process industries and uses; construction, illustrations, specifications, and prices. Wm. Hiergesell & Sons, 295 Pearl st., N. Y. City.
H-O-H Lighthouse Reprints. Catalog, subject of scale and corrosion control in water using systems covered in clear, concise language; profusely illustrated with photographs, charts, diagrams and graphs; chemists or engineers responsible for water conditions will find much valuable information in this catalog. D. W. Haering & Co., 3408 W. Monroe st., Chicago, Ill.
Houghton Line, April-May, 1938, aside from listing company's products for lubricating service, this house organ presents lively editorials on interesting present day controversies. E. F. Houghton Co., 240 W. Somerset st., Phila., Pa.
Hydroresin A. Leaflet, uses, descriptions, and prices of water soluble resin, which possesses adhesive properties. Glyco Poducts Co., 146 Lafayette st., N. Y. City.
Hydrovolifier, for cleaning, dehydrating, and degasifying oils used in transformers, regulators, switches, cables, bushings, etc.; booklet, features, uses, cost charges, and chart for operation. Buckeye Labs., Inc., Alliance, O.
Hy-Speed Liquid Handling and Process Equipment. Catalog 137, users of this type of equipment will find in this catalog a complete description of company's line, with sizes, specifications, uses, and illustrations. Alsop Engineering Corp., Milldale, Conn.
Indicating Pyrometers. Bulletin No. 193-3, on mono-pivot type, also resistance thermometer indicators; illustrations clarify principle of former instrument; details of construction and standard scales for single-and double-range instruments. Foxboro Co., Foxboro, Mass.
Inside Story of Crane Plug Disc Globe and Angle Valves. Booklet, full page table lists essential characteristics of each member of this plug disc family, heavily illustrated. Crane Co., 836 S. Michigan ave., Chicago, Ill.
Link-Belt News, May, 1938, valuable fund of information on conveying and transmitting problems; latest installations portrayed in print and photos. Link-Belt Co., 307 N. Michigan ave., Chicago, Ill.
Magnetic Motor-starting Switches, for full-voltage starting of A-C motors, squirrel cage motors, or for use as primary switches on wound-rotor motors, Bulletin GEA-2889, on type CR7006, construction and operation. General Electric Co., Schenectady, N. Y.
Metallic Soaps. Folder, lists company's products in this line, giving constructive data on uses and specifications of each product. Beacon Co., 89 Bickford st., Boston, Mass.
Millivoltmeter Pyrometers. Bulletin No. 48, useful information on construction and operation of all models in company's line; data concerning available ranges and drilling dimensions, scale reproductions in actual sizes. Bristol Co., Waterbury, Conn.
Neoprene Notebook. No. 2, valuable data on new products and processes; discussions of various problems encountered with its use; also announcement of new plant being opened by company for its production. E. I. du Pont de Nemours & Co., Wilmington, Del.
New Track-Type Limit Switch, device for use in automatic control circuits, Bulletin GEA-2052A, on type CR9440-A1A, operation, dimensions, and applications. General Electric Co., Schenectady, N. Y.
Oilproof Push Button and Selector Switch, designed to meet rigorous requirements of machine-tool service, Bulletin GEA-2908, descriptions, prices, and station data. General Electric Co., Schenectady, N. Y.
Packomatic Container Sealing, Boxing, and Serial Numbering Equipment. Folder, descriptions, sizes, and illustrations of actual installations. J. L. Ferguson Co., Joliet, Ill.
Parkerizer, April, 1938, chiefly devoted to announcement of opening of new offices and laboratories. Parker Rust-Proof Co., Detroit, Mich.
Pipe Line Flexible Seals, for marine and industrial use, Bulletin No. 300, briefly described, illustrations, dimensions. E. B. Badger & Sons Co., Boston, Mass.
Plumbing for Industrial and Commercial Buildings. Catalog, detailed guide for installation of plumbing and heating equipment. Crane Co., 836 S. Michigan ave., Chicago, Ill.
Portable Universal pH Indicator for Laboratory and Plant. Catalog, covers entirely new potentiometer for pH measurement, with self-contained glass electrodes; meets need for a convenient, direct-reading instrument; efficient for use in a wide variety of applications in the process industries. Leeds & Northrop Co., 4901 Stenton ave., Phila., Pa.
Ransome Industrial Mixers. Bulletin No. 503, features many new types of dustproof mixers for chemical, fertilizer, glass, and other industries; profusely illustrated with diagrams, mixing actions, etc., all helpful to those having mixing problems. Industrial Mixer Division, Ransom Concrete Machinery Co., Dunellen, N. J.
Research Puts the Diatom to Work. Booklet, revised edition, on Celite, interestingly written in language of the layman, reveals how hundreds of different types of finished products are developed from one raw material; excellent example of how research and resulting technological advances have created thousands of new jobs. Johns-Manville, 22 E. 40th st., N. Y. City.
Retorts, Spring and Summer issue, 1938, published as informative medium on latest chemical developments; contains ready reference list, for customers, of chemicals and raw materials. Rolls Chemical Co., Buffalo, N. Y.
Rooflex. Leaflet, on new economical material for patching roof leaks. Flexrock Co., 800 No. Delaware ave., Phila., Pa.
Screw Pumps. Bulletin S-104-A, construction and operation; blue print charts and illustrations. **Centrifugal Pumps.** Bulletin C-213, on Type G, vertically split case end suction. **Centrifugal Pumps Vertical,** Bulletin C-209, and **Centrifugal Multi-Stage Pumps,** Bulletin C-106-A, descriptions, specifications, and illustrations. Quimby Pump Co., 340 Thomas st., Newark, N. J.
Series "P" Compressed Air and Gas Aftercoolers. Bulletin A-21, details features and sizes available. Sullivan Machinery Corp., Michigan City, Ind.
Simpson Intensive Mixer. Bulletin, covers complete line of mixers, several different sizes discussed; operates on mulling principle; useful in chemical and process industries for boiler compounds, storage battery plate paste, fertilizers, cements, etc. National Engineering Co., 549 W. Washington blvd., Chicago, Ill.
Single-Stage Horizontal Compressors. Class WG-7, Bulletin A-12-A, revised edition, includes illustrations and description of improved Dual Cushion Valve now used in these machines. Sullivan Machinery Co., Michigan City, Ind.
Sink-and-Float Process for Beneficiation of Coal and Minerals. Booklet, technically describes this development of economic importance in the coal mining and other fields; supplements data already widely heralded in the literature; separate chart lists minerals amenable to separation by this process. E. I. du Pont de Nemours & Co., Wilmington, Del.
Socket Instruments. Booklet, illustrates installations, applications, and economies of these plug-in instruments; complete line of company's electrical instruments shown. Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.
Streamline Protection. Bulletin, describes U. S. Standard Horizontal Unclosed Motor, and shows method of ventilation provided in these motors. U. S. Electrical Motors, 200 E. Slauson ave., Los Angeles, Calif.
Super High Intensity Type IR Induction Magnetic Separators and **Type E (Rowand-Wetherill) Cross Belt Machines.** Catalog 770, complete descriptions, including many other types of machines made by company. Dings Magnetic Separator Co., Milwaukee, Wis.
Tea Tree Oil (also known as Ti Tree Oil), leaflet, origin, chemical and physical properties, uses, and instructions on dilutions for use; prices. R. F. Revson Co., 91 7th ave., N. Y. City.
Versatile Service of Bakelite Plastics. Booklet, history of plastics from their discovery to present day, and multitude of adaptations which they have found in industry, told in concise, entertaining style. Bakelite Corp., 247 Park ave., N. Y. City.
Water Distilling Equipment and Accessories. Catalog, details construction and operation of all Barnstead stills; data tables containing sizes, weights, capacities, and other information; well illustrated. Barnstead Still & Sterilizer Co., 67 Lanesville ter., Forest Hills, Boston, Mass.
Water Treatment. Reprint, "Acid and Reactive Colloids for Cooling Water Treatment," few copies available of this paper presented by L. D. Betz before Petroleum Section, A.C.S., recently. W. H. & L. D. Betz, 235 W. Wyoming ave., Phila., Pa.
Wood Pipe Handbook. Catalog, subject matter ranges from an authoritative section on hydraulics to description of manufacture and application of wood pipe; engineers problems solved scientifically and through use of flow tables. **Wood Tank Catalog,** No. 37, tank installations of a wide variety, showing how tanks and their foundations are designed and erected, using typical, clear sketches. National Tank & Pipe Co., Kenton Sta., Portland, Ore.

New Chemicals for Industry

A digest of products and processes

Rubber Vulcanizing Agents

By T. L. Garner, M.Sc.

IN the old history of the development of the rubber industry the names of Goodyear and Hancock are usually linked as the pioneer discoverers of vulcanization about the year 1843. The question of priority is difficult to decide and after all is of no fundamental importance, since it is well known that both investigators were working independently along similar lines and arrived at their discoveries without knowledge of the other's experiments. Sulfur had formerly been used with the idea of reducing the tackiness of unvulcanized rubber sheets, but the discovery that by its use rubber could be transformed from a plastic substance to an elastic one heralded the birth of the rubber industry as it is known today.

Sulfur, which is almost universally used in the vulcanization of rubber goods, is one of the cheapest commodities available to the rubber compounder, and, but for its well known effect in rubber mixings, might have become a widely used filler. The bulk of the world's requirements of sulfur is formed in Sicily where the limestone-sulfur rock is ignited in large kilns, part of the sulfur providing the heat required to melt the remainder, which is then collected at the bottom of the kiln. The method is extremely wasteful, and not more than seventy per cent. of the sulfur is recovered in the process. Sulfur is also found in Louisiana, but at considerable depths, the method of extraction being to force superheated water through the pipe wells into the deposit, the sulfur being thus melted and forced to the surface with the water by an air lift system. Practically pure sulfur is obtained in this manner and there is no waste.

The molecular complexity of sulfur depends upon the temperature, but up to its boiling point the molecule contains eight atoms. Above boiling point the molecular size decreases, until at about 700° C. it corresponds to the formula S_2. Weber considered that the S_2 molecules were responsible for vulcanization in rubber and that the latter could only occur as the S_8 molecules dissociated. Since sulfur only dissociates slightly at comparatively high temperatures a considerable excess was therefore necessary for practical vulcanization. This theory was discounted as a result of later research, and it is now held that the different allotropic forms of sulfur which may normally be present have remarkably little divergent properties towards rubber.

Sulfur dissolves in rubber, fortunately, thus providing uniform distribution of the former during the vulcanizing process, even if the actual mixing process has not resulted in a very good dispersion. The solubility has been calculated to be as high as 20 per cent. at normal vulcanization temperatures, but it falls to about one per cent. at ordinary temperatures. Obviously, therefore, mixings containing less than one per cent. sulfur in the uncombined state should not show appreciable sulfur bloom, but in practice several factors upset this observation. For example, it has been found in practice that a rubber mixing containing a high percentage of sulfur uncombined with the rubber shows less tendency to bloom than one having a much smaller sulfur content; the reason is that the higher sulfur content ensures a crystallization center of undissolved sulfur within the rubber mass, which leads to internal crystallization of sulfur and consequently less blooming. A similar result may be obtained by introducing into the rubber relatively insoluble particles isomorphous with rhombic sulfur, thus providing the necessary internal crystallization nuclei. With unvulcanized rubber mixings where tacky surfaces are often required, blooming and consequent destruction of the tackiness can be discouraged by maintaining uniform shop temperatures, preventing isomorphous dust settling on the rubber or being conveyed there by workers' fingers, etc., and by keeping temperatures low while mixing to ensure that a part of the sulfur remains undissolved. The use of a variety of sulfur containing a proportion of insoluble sulfur has also been suggested to assist in the latter connection. Further, since sulfur is more soluble in vulcanized than in unvulcanized rubber the presence of reclaimed rubber in a mix tends to reduce blooming.

Sulfur was formerly used in much larger amounts than is customary today, organic accelerators having resulted in the development of satisfactory non-blooming rubber qualities with sulfur contents of about two per cent. and in some cases below one per cent. While it is generally accepted that some chemical combination occurs between the rubber and sulfur, little is known as to the molecular compositions of the products in soft rubber. It is definite, however, that the proportion of sulfur required in the production of the latter is less than would be required to produce any simple rubber-sulfur compound. In the production of hard rubber or ebonite, for which much higher percentages of sulfur are used, the essential constituent resulting is represented by the formula $C_{10}H_{16}S_2$.

While the use of sulfur in most ordinary rubber mixings is still customary to secure vulcanization, there are other methods of attaining good physical properties in rubber, some of which make use of sulfur-containing agents. Thus, sulfur chloride is largely used for the vulcanization of thin rubber articles, such as dipped goods; it can be used only on thin products since the process relies on the penetration of sulfur chloride vapor into the rubber. Alternatively, a solution can be used. In the first case a suitable tank is filled with the vapor of the liquid, evaporating on the floor of the chamber, and articles are suspended in it for perhaps an hour at about 180° F. The actual time depends on the humidity. Using the liquid, the article to be vulcanized is dipped into a solution in carbon disulfide, usually two per cent. in strength, and while the time varies with thickness it is only a matter of seconds. In both processes articles must be thoroughly dry before vulcanization and must be well washed after the process, or bad ageing will result. Both methods are objectionable, the sulfur chloride being a yellow poisonous liquid which fumes in the air, and has an irritating effect on the nose and throat.

In the Peachey process for vulcanization, which was not very widely adopted, thin sheets of rubber were saturated with hydrogen sulfide and then sulfur dioxide was introduced to interact with it and thus produce active sulfur, vulcanization taking place rapidly at ordinary temperatures.

The use of selenium which belongs to the same group in the periodic classification as sulfur, as a vulcanizing ingredient, has been the subject of much research, but it is now considered as a valuable aid for use with sulfur rather than as an independent medium. It is recommended in this way to reduce the

tendency of sulfur to bloom out, and also to improve the physical properties for certain applications. In the latter connection, claims made some years ago in America that selenium gives markedly improved resistance to abrasion were soon found to be unsubstantiated, however, and it is probable that this did not help the development of this new vulcanizing agent. Several patents have also been taken out for the use of organic compounds of selenium in rubber, such as selenium diethyldithiocarbamate. The use of 1.3.5 trinitrobenzene as a vulcanizing agent was first suggested by Ostromislensky in 1915, since when the value of the method has been a subject of considerable controversy. There has apparently been little commercial development of this process of vulcanization.

The vulcanization of soft rubber cannot be regarded as a purely chemical change as only part of the rubber combines with the sulfur, the remainder undergoing some change not thoroughly understood. Theories are complicated by the fact that heavy compounding of rubber with carbon black gives an unvulcanized product which in some ways behaves like vulcanized rubber. For example, it is not soluble in the usual rubber solvents, and its presence interferes with the removability of free sulfur.

In conclusion, reference must be made to the vulcanizing of the synthetic rubbers, which are now rapidly increasing in importance. These require an entirely new technique and may be vulcanized by means of materials which in ordinary rubber are normal compounding ingredients. Thus zinc oxide is the essential vulcanizing agent in some cases, so that in discussing vulcanization agents synthetic rubbers must be clearly distinguished from natural types.—(*Chemical Age,* Mar. 26, '38, p. 241.)

Artificial Zeolite

Silicat, an artificial zeolite made from sodium aluminate and bauxite, is reported being manufactured in a factory in Marseilles, and is said to possess very satisfactory water-softening properties.

Potato Preservative

Phenylboric acid as a preservative for potatoes is proposed as a result of investigations at the U. S. S. R. Research Institute for Fertilizers and Insecticidés. Potatoes so treated can be stored for long periods in unfavorable conditions. Nitrophenylboric acid has also been found of value for the preservation of a wide range of agricultural products. *Chemical Trade Journal,* Apr. 29, '38, p. 360.

Acid-resistant Plastic

A plastic being manufactured at the Wladimirski factory (Russia), under the name of "Faolit," is stated to be a combination of asbestos and phenol-formaldehyde synthetic resin, and to be highly resistant to acids. *Chemical Trade Journal,* Apr. 29, '38, p. 356.

Conversion Lignin into Alcohols

A process using copper-chromium oxide as a catalyst, by which 1,500,000 tons of lignin now discarded annually in the United States can be converted into useful chemicals was announced by Professor Homer Adkins, University of Wisconsin, at a recent A. C. S. meeting. More than 70 per cent. of lignin can now be hydrogenated into four known alcohols and glycols, including wood alcohol. In the laboratory 28 per cent. has been converted into wood alcohol, or methanol, and almost 50 per cent. into an alcohol and two glycols which are derivates of propocyclohexane.

The yield of wood alcohol obtained by the new process is several times as great as that obtained by the distillation of wood.

New Molding Materials

An entirely new series of molding materials which considerably reduce the injection molding cycle are announced by Celluloid Corp., Newark, N. J. Designated as Lumarith "I" Formula Series, their development is in step with the rapid progress made in the development of injection molding machines, whereby shots have increased from grams to ounces and projection mold areas have increased to 50 sq. inches or more. Thus it is claimed that this new compound, which is a cellulose acetate material, is faster setting under the same cooling conditions than present materials; has equal or superior flow at the same temperature range as present materials, possesses equal or superior strength of the molded article when compared with present standards.

Tall Oil in Coatings

It is claimed (*National Paint Bulletin,* Apr. '38, p. 18) that tall oil aids in rendering a coating as a rustproofing agent. The proper ratio is one part tall oil ester and four parts of linseed oil. This renders a material rustproof for three to four years.

Nitrogenous Fertilizer

A nitrogenous fertilizer, "Ammotorfol," is to be produced on a semi-technical scale in Russia, the essential operation being treatment of peat with ammonia liquor from gasworks and then with ammonia.—(*Chemical Age,* Apr. 9, '38, p. 288.)

Finishes for Ovens

An outstanding development in Dulux and synthetic enamel oven design has recently been made by engineers of the Despatch Oven Co., Minneapolis, Minn. Improved finishes are obtained in less time and with real operating economies on a high production schedule.

Retarder for Vulcanization

A retarder, known as RM, for preventing scorching in stocks containing combinations of a Captax-type accelerator and a guanidine accelerator has been developed by Rare Metal Products Co., Belleville, N. J. It is said to control the vulcanization of this type of stock without reducing the ultimate tensile strength. In molding rubber products the delayed vulcanizing action allows time for the compound to fill the mold completely before the curing begins.

Glycerin Substitute

Yumidol, a special grade of sorbitol is announced by Glyco Products Co., 148 Lafayette St., New York City, and its use is suggested in place of glycerin for overcoming the disadvantages incurred in use of latter. Material is a straw colored viscous liquid, and has a higher sp. gr., viscosity, and refractive index than glycerin. It is less hygroscopic in moist air and retains its moisture longer than glycerin does in dry air. Changes, therefore, under varying conditions of humidity are much less drastic than when glycerin is used. Its use is indicated in place of glycerin for purposes where animal matter is objectionable. It can also replace sugar where the latter is undesirable because of physiological or fermenting effects. It has the following properties: soluble in water, alcohol, methanol, glycols and glycerin and most water soluble materials; insoluble in oils, fats, waxes, resins and other water insoluble materials; non-inflammable and non-volatile, does not produce acrolein or other acrid products even on prolonged heating. Its use is suggested as a softener, plasticizer and flexibilizer for paper, textiles, leather, cork, wood veneers, gaskets, adhesives, printers' rollers, hectograph pads, etc. As a suspending agent for pigments, abrasives, polishes, water colors, water soluble inks; thickener and bodying agent for lotions, pharmaceuticals, and other aqueous fluids; electrical conductor for electrolytic condensers, and as a vehicle for conductive pastes.

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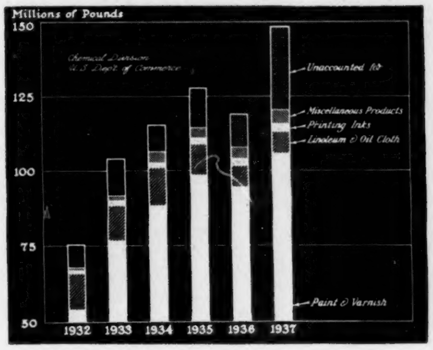
SOLVENT NEWS *Reg. U.S. Pat. Off.*

JUNE ★ A Monthly Series of Articles for Chemists and Executives of the Solvent-Consuming Industries ★ 1938

U. S. TUNG OIL CONSUMPTION



Use New Denaturant In C.D. 14 Formula; T.D. to Revoke C.D. 11 July 1st

WASHINGTON, D. C.—A new formula for Completely Denatured alcohol was authorized by the Treasury Department on April 29 to replace the present C.D. formula No. 11. The new formula, to be known as C.D. 14, became effective immediately. Formula C.D. 11 is revoked as of July 1, 1938.

Treasury Decision 4802 authorizes the following composition for the new formula:

To every 100 gallons of ethyl alcohol of not less than 160° proof add:
- 5 gallons of FD-13 or a product similar thereto,
- 2.25 gallons of methyl isobutyl ketone

Specifications for Denaturant FD-13 were made public by the department on May 14, in AT-Circular No. 387. The circular states, "this material consists of organic hydrogenated and dehydrogenated products free of water and suspended matter, and is distinguished by its characteristic taste and odor."

Methyl isobutyl ketone is now used as a denaturant in C.D. formulas 12 and 13, which continue in force.

[*The above information has been extracted from T.D. 4802 and AT-Circular No. 387, to which reference is made for the full text.*]

Alcohol Drying Yields Wool Fibers From Silk

FRANKFORT-ON-THE-MAIN, Germany—Wool-like fibers can be made from artificial silk by dehydrating with alcohol, it is claimed in a patent recently granted three inventors here. Fibers produced by the new process possess warmth, softness, elasticity and strength approaching that of natural wool, the inventors report.

In place of washing and drying filaments obtained in the production of artificial silk by the cuprammonium process, the inventors suggest preliminary drying by mechanical means, followed by dehydrating by passing through successive baths of increasing alcohol concentrations (from 30% to 95%).

[All C.D. and S.D. alcohol formulas are available with U.S.I. Anhydrous Alcohol.]

Paper Collapsible Tubes

As part of its program of "ersatz" Germany has been experimenting, for a number of years, with paper tubes to replace tin and lead, according to an article in the *Packaging Parade.* Special resin adhesives have been developed and many new styles and shapes have been introduced, the article reports. A white coat of "paint" is said to give the tubes an appealing appearance.

U.S.I. Synthetic Resin Division Makes Wide Range of Ester Gums

Varies Properties to Meet Special Requirements of Coatings, Ink, Adhesive, Linoleum, and Floor Tile Industries

Manufacturing operations of the synthetic resin division of the U. S. Industrial Alcohol Co., formerly the business of Robert Rauh, Inc., have now become integrated with other U.S.I. operations. With the addition of these new manufacturing facilities, U.S.I. is able to offer its customers a closely knit service that covers a complete line of synthetic resins as well as important solvents and chemicals. Products of the synthetic resin division include phenolics, alkyds, copal esters and ester gums.

This is the first of a series of articles which outline some of the principal applications of synthetic resins manufactured by the U. S. Industrial Alcohol Co. Subsequent articles will describe phenolics, alkyds and copal esters.

To meet the individual requirements of the protective coatings, printing ink, adhesives, linoleum and floor tile industries, U.S.I. Ester Gums can, by use of proper equipment and control in the course of manufacture, be varied in such characteristics as color, hardness, acidity and solubility. This versatility of U.S.I. Ester Gums, apart from their initially low cost, fits them to many special applications.

Seven Types of Ester Gums

Among the ester gums offered by U.S.I. there are five general types manufactured from rosin and two from copal gum. Rosin esters range from the low acid number, pale-color type to the high acid number, alcohol-soluble type.

A number of manufacturers, faced with the problem of formulating lacquers with a relatively high resin-cotton ratio or with solvent blends consisting substantially of low boilers, have found Rauzene AS-1 a valuable aid in overcoming "blush." This characteristic, coupled with a high alcohol tolerance, is favorable to the use of less expensive solvent blends and has placed AS-1 in an important position on the list of resins used in economical lacquer formulations.

In varnishes of high water resistance, outdoor durability, fast drying qualities and freedom from livering with basic pigments, Rauzene 1 and Rauzene 00 are finding a widening circle of uses. Rauzene 1 is characterized by extra hardness and a very high melting point. Consequently, it is also adapted to lithographic varnishes.

Good Outdoor Durability

In addition to its well founded applications in varnishes, Rauzene 00 is extensively used in lacquers. Because of its particularly good color retention and the fact that it is one of the most easily handled resins, 00 Ester Gum has more or less justifiably earned the name of an "all-purpose" resin. Rauzene 4LW is a

(Continued on next page)

Bill Increases Alcohol Tax 25c a Proof Gallon

WASHINGTON, D. C. — Needing only the signature of President Roosevelt to become law, the tax bill passed by the House on May 11 provides for an increase of 25c a proof gallon on the present $2 per proof gallon tax on distilled spirits. The added tax will increase the cost of 190 proof industrial alcohol by 47½c per wine gallon. Authoritative reports said that it was expected that the President will sign the bill.

The measure as sent to the White House did not contain a tax on floor stocks. The following day, however, a bill which does include a floor tax was introduced.

Inventor Uses Ethylal For "Germicidal" Paint

WOODHAVEN, N. Y.—A paint containing ingredients "which, during the normal life of the surfacing film, continuously and progressively are latent with the property of generating toxic components to bacteria, germs, fungus and other pathogenic bodies" is revealed in a patent granted to an inventor here.

Explaining that he has adopted as an ingredient, ethylal which generates minute quantities of formaldehyde, the inventor points out that he also utilizes the "toxic properties" of chlorine, sulphur, phenol and formaldehyde as the active components in a vehicle.

Ethylal, or other high-boiling acetals, is added to the thinner in the proportions of 2%-50% by volume, although the inventor prefers about 10% as the optimum amount. Sulphur and chlorine may be introduced as sulphur monochloride for polymerizing perilla oil. Phenol and formaldehyde are condensed in the presence of wood oil, rosin (or ester gum) and sulphur monochloride to provide a "metastable" phenol formaldehyde resin varnish.

The final paint, combining polymerized perilla oil, phenol resin varnish, and ethylal-bearing thinner, forms a "durable finishing material of innocuous character during application" but which renders available "components conductive to hygienic conditions."

[Among the products mentioned above, U.S.I. manufactures Ester Gum and Phenolic Resins.]

New Solox Drum
Latest addition to the family of easily identified U.S.I. containers is this attractive blue, red and white 5 gal. drum for U.S.I.'s proprietary solvent.

JUNE ★ **SOLVENT NEWS** ★ 1938

Says Nitrostarch Makes Low Viscosity Lacquers of High Solids Content

JERSEY CITY, N. J.—How he has succeeded in producing from nitrostarch, lacquers which can be applied—in spite of their solids content of 70%—to paper, rubber, etc., in a single coat so as to yield films as thick as 0.002" or as thin as 0.0003" is revealed by an inventor of this city in a patent just granted.

A typical formulation is given as:

	Parts by weight
Nitrostarch-viscosity 4-6 centipoises	40
Ester gum	5
Dibutyl phthalate	16
Paraffin	1
Solvent mixture	38
	100

The solvents employed are, according to the patent, alkyl acetates, ketones, aromatic hydrocarbons, aliphathic hydrocarbons, etc., in which nitrostarch is soluble and mixtures of these compounds with each other or with diluents such as alcohol.

Films of nitrostarch, the inventor explains, are ordinarily both weak and brittle, yet with the incorporation of 42-46% plasticizer of the weight of nitrostarch (amounts regarded as excessive in conventional lacquers), these films can be made to adhere so strongly to backings such as paper, that film and backing act almost as a "unitary mass." Tackiness is prevented, he asserts, by adding hydrocarbons such as paraffin.

At the same time, the inventor continues, nitrostarch lacquers of this type have other outstanding advantages including lower cost than nitrocellulose of the same viscosity, stability on long exposure to strong sunlight, imperviousness to moisture, and the ability to be "heat sealed." Further, he adds, they reduce the amount of solvent required.

[Among the products mentioned above, U.S.I. manufactures Ester Gum, Dibutyl Phthalate, and Alkyl Acetates.]

Telephones Need No Power

Telephones which require no batteries or other power source to operate the speaking circuit were announced recently. Unusual clearness and fidelity, elimination of maintenance, safety, and portability are some of the advantages claimed. According to the manufacturer, the speaker's voice, acting on a diaphragm in the mouthpiece, induces currents which are converted into the original vocal tones by the receiving telephone.

Two New Denaturants For Ethyl Acetate Approved

WASHINGTON, D. C.—Explaining that the Treasury Department "has determined that under present conditions denaturing grade wood alcohol or methyl isobutyl ketone possess denaturing properties as satisfactory as the denaturing properties of calol ethatate," Stewart Berkshire, Deputy Commissioner, recently notified producers that both products had been added to the list of approved denaturants for ethyl acetate.

Ethyl acetate, except when used for pharmaceutical, scientific and food preparations or as a denaturant for S.D. alcohol must be denatured in accordance with T.D. 4748.

Mr. Berkshire's announcement, AT-Circular No. 374, states that producers may in the future add either one gallon of methyl isobutyl ketone or 5 gallons of denaturing grade wood alcohol in lieu of ⅛ gal. of calol ethatate to every 100 gals. of ethyl acetate.

He also said: "When a user desires to obtain ethyl acetate denatured with chemicals other than calol ethatate, denaturing grade wood alcohol, or methyl isobutyl ketone, application must be made in accordance with the provisions set forth in Treasury Decision 4748."

[The above information has been extracted from AT-Circular No. 374, to which reference is made for the full text.]

Resin Division Makes Variety of Ester Gums

(Continued from previous page)

a similar resin, but has a slightly lighter color and is not quite as hard.

Among ester gums used for adhesives, emphasis is naturally placed upon the plastic nature and surface tack of the resin. Rauzene AS-6 has been developed specially for this purpose. It is considerably softer in melting point (45-55 deg. C.) than other U.S.I. Ester Gums so that it develops a very desirable surface tack. This same property has also been responsible for its use in lacquer formulations where a plasticizing action is desirable.

Alcohol solubility, a feature not usually found in common ester gums, is a distinguishing characteristic of Rauzene AS-90. This adapts it to spirit varnishes. Having also low viscosity characteristics, it may be employed in lacquers of high solids contents.

Charts listing the principal physical characteristics of U.S.I. Ester Gums may be secured by writing to U.S.I.

TECHNICAL DEVELOPMENTS

Further information on these items may be obtained by writing to U.S.I.

A new type of napthenic sulphonate is said to be preferentially oil soluble and to have exceptional ability in the preparation and stabilization of emulsions such as cutting oils, orchard sprays, wool oils, lacquers, etc. It is also described as a good thixothropic agent. **(No. 101)**

U S I

Plastic tubing for conveying alcohol and other organic solvents has been introduced. Having remarkable pressure resistance, flexibility that permits it to be "tied into knots" and the ability to resist prolonged vibration, it has the added advantage, acording to the manufacturer, of being completely inert to gasoline, oil, ethers, esters, alcohols, ketones, etc. **(No. 102)**

U S I

Mica-pulp containing 25% altered mica by weight is now available for casein paints. The product is said to impart unusual covering power and workability since it possesses properties midway between ordinary mica and vermiculite. **(No. 103)**

U S I

A new metal protective is said to have unusual adhesive strength and highly polar chemical acting inhibitors of corrosion. Great advantage is claimed for the material when used on metals subject to exceptionally corrosive conditions and subsequent cleaning. **(No. 104)**

U S I

A new preservative for wood, canvas and net is described as a combination of chemicals which penetrates the cells of wood and other materials and affords permanent protection against rot, mildew, teredos, termites, etc. **(No. 105)**

U S I

Acetate of soda in the form of "puffy kernels" which do not harden or pack together, was introduced recently. The manufacturer describes the product as an iron-free technical grade which is speedily soluble without boiling or cooling. It is available in barrels or multiwall paper bags. **(No. 106)**

U S I

A cleaning solution, now available for the removal of brass tarnish and oxide film, is said to impart a satin-like finish which remains bright for a year or more. The manufacturer claims it is non-fuming, and forms an invisible film over the metal surface. **(No. 107)**

U S I

Shrinkage in mortars can be eliminated by adding specified quantities of a new material, containing iron particles, the manufacturer claims. Expansion of the iron particles is said to compensate for natural shrinkage in concrete, thus allowing for complete bonding of new concrete with old. It is also recommended for grouting, repairing and resurfacing floors, repairing under aggressive water conditions, etc. **(No. 108)**

U S I

Synthetic fatty acids and glycerides which are said to have valuable film-forming properties were recently introduced. The manufacturer states that they consist of relatively pure, highly unsaturated acids similar to clupanadonic and linolenic acids and that they are almost as low in cost as the raw oils from which they are prepared. **(No. 109)**

Cleaner for Venetian Blinds

A liquid cleaner for Venetian blinds, known as "See-More," is announced by Seymour Products Co., 1424-A Merchandise Mart, Chicago. It is said to dissolve and remove dirt, grease, fly specks and water spots.

Odor Remover for Dry Cleaning

Fast, safe, and complete removal of perspiration and other odors from garments in dry cleaning plants is now possible in a simple and inexpensive operation through use of Shoo, product of Caled Products Co., Brentwood, Md. It is said to be a white powder, harmless to colors and fabrics, and is merely dusted on the affected area where it completely destroys odors. It can then be brushed out or rinsed out with solvent.

Aluminum-coated Steel

Al-Plate, an aluminum-coated steel, is now being manufactured under a patent owned by Dr. Colin G. Fink, Columbia University, New York. Product can be drawn and has a tensile strength equal to the base metal. The surface will take a mirror finish which will last indefinitely at ordinary temperatures. The process consists in anodically attacking the surface in a weak acid solution and then passing the steel sheet or plate through a bath of molten metal. The surface can also be colored and parts can be formed subsequently with little injury to the color, according to the claims.

Mica Pigment for Paint

A special mica pigment for paint, called Aratone-270, is being made by Atlantic Research Associates, Newtonville, Mass. Pigment is so made that it retains the desirable thin, flake-like quality of the mica in each tiny particle. It is said to control weathering, chalking, tint retention, penetration, brushing, dirt retention, checking, corrosion settling, flexibility, chemical-electric resistance and moisture resistance. In addition, it improves outside and interior paints, primers and sealers, metal protective and traffic paints, chemical and electrical-proof finishes and aluminum-gold-copper powder paints.

Dry Cleaning Preparation

Silkcleen, a preparation removing ink, blood, coffee, Coca Cola, tannin, yellow, fruit juice and other stains, is being marketed by Silkcleen Mfg. Co., Chicago. It is packed in small handy tubes for convenient use and is described as a digestive agent of improved quality. It contains no acid, is non-liquid and safe to Celanese.

Filter Powder

A filter powder of interest to the dry cleaning trade is being made by American Diatomite Corp., Clermont, Fla. Diatoms, minute aquatic plants, form the basis of the powder called Monalite, those used being of the long, box-like type, each diatom serving as an individual filter through which solvent passes under pressure, while the structure itself serves as a receptacle for solids.

Heavy Duty Cleaner

A heavy duty cleaner for cleaning a large variety of painted, marble, tile and other surfaces, called "Magnus 55-P," is a recent development of Magnus Chemical Co., Garwood, N. J. Product is a heavy, viscous, clear oil which dissolves in either warm or cold water. It is similar to a neutral soap in its general properties, being free of alkali, alkaline salts, acid or abrasive, but has superior penetrative and solvent properties. It does not harm the surface washed, yet cuts and removes oily dirt, traffic film, etc., and does not leave a bluish gray cast. In addition to being a cleaner, product is also said to be an effective antiseptic and deodorizing agent.

Novel Plastic for Building Trades

Manufacture of an improved plastic for use in the building, constructional, and allied trades, which embodies many new features and is said to be unique in that it adheres not only to stone, brick, cement and wood, but also to iron and steel, is reported in *Chemical Trade Journal*, Apr. 29, '38, p. 362. Prolonged tests have demonstrated its general suitability. An important feature is that no special keyed surfaces have to be prepared. The cost of manufacture, including all raw materials, is relatively low compared with other decorative or specialized plasters. Material can be applied by spray gun, by hand brush or by trowelling, and no special training of labor is necessary. Another unusual feature is its general suitability for floorings.

Degreasing Agent

"Gunk Compound M-F," for use as a degreasing agent and cleaner for the insides of motor blocks, is a new development of Curran Chemical Corp., Malden, Mass. Product is said to wash away all carbonaceous tars as well as gums and sludge.

Boiler Compound

KC—30 is a special compound for preventing boiler scale formation, to remove old scale and stop corrosion and pitting. It is finding wide use in the dry cleaning industry, according to the maker, Safety Engineering Co., No. Kansas City, Mo. It will not cause embrittlement, carry over with steam, produce foaming or brining.

High Purity Zinc Oxide

A new calcined zinc oxide for use in vitreous enamels, glass and pottery glazes has been developed by International Smelting & Refining Co., East Chicago, Ind. Material is made from French process zinc oxide of high chemical purity. It has a low volume shrinkage, less than 5 per cent. at 2,000° F., and a high apparent density, weighing approximately 50 lbs. per cu. ft. The low volume shrinkage shows that the material is thoroughly calcined and suitable for use in high zinc oxide glazes without danger of crawling or parting. The density makes the material suitable for use in enamel fritting and glass batches because it mixes well with the other ingredients and offers less possibility of loss due to dusting.

Spot Dyes for Retouching

A series of spot dyes for retouching, including 42 colors, are offered by Leo White, 45 Sycamore Ave., Pasadena, Calif. They are made for use on garments or rugs, and grouped into convenient kits. The garment spot dyes are in slab form and guaranteed not to dry out. Colors are not affected by perspiration. The slabs are provided in two sets, of 42 and 20 colors each. Rug spot dyes are opaque, and used for covering stains, restoring designs and faded spots, retouching drapes and upholstery.

Brushable, Corrosion-resistant Coating

Amercoat Rapid-Dry Coating, new product of American Concrete & Steel Pipe Co., 4635 Firestone Blvd., South Gate, Calif., is a quick-drying solution which may be applied with a paint brush or with paint spray equipment to form a protective covering for exterior and a lining for interior surfaces that are subjected to the corrosive action of liquids, gases or solids. This coating is supplied ready-mixed for immediate application over Amercoat Concrete Prime or Amercoat Metal and Wood Prime, and its coverage is from 200 to 250 sq. ft. per gal. For ordinary protection against corrosive fumes, weathering, etc., a single coat over the proper Amercoat Prime will be ample protection, but a second or third coat will increase the corrosion-resistance where conditions make two or more coats necessary. It will resist the action of acid and alkali and other types of corrosive agents up to and including 20 per cent. concentration.

Waxes for Textile Trade

A group of I. G. waxes, for use in the textile industry as substitutes for natural waxes, are announced by General Dyestuff Corp., 435 Hudson St., New York City.

Finely-powdered Wax

Waxes are obtained in the form of a fine powder by treating the molten wax with an aqueous solution or dispersion of an emulsifying agent, to form a wax emulsion which is then diluted and cooled to a temperature below the melting-point of the wax (E. P. 477,280, *Chemical Trade Journal,* Apr. 1, '38, p. 276). Molten paraffin wax, for instance, is slowly poured into a boiling soap solution with stirring. Cold water is then slowly added with stirring. Finely-powdered wax separates and rises to the surface, from which it is removed, washed and dried.

Tough Filter Paper

A filter paper of high strength has been introduced abroad under the name "Green's 904." The wet strength of this paper is said to be about four times as great as that of ordinary filter paper and can be used under suction of high vacuum without breaking. It is very fast and retentive, of fine precipitates and has a low ash (.0020 gram for a paper of 11 cms. circle). Further, it is claimed to be much more resistant both to strong acid and alkaline solutions than the usual filter paper and retains its matted fibrous texture when wetted, enabling precipitates to be removed without breaking the paper or mixing cellulose fibres with the precipitate. The quantity of liquid actually absorbed by the paper is less than with ordinary filter paper (the fibres of which become partially hydrated on wetting), so that the time spent in washing precipitates is substantially reduced. (*Chemical Age,* May 7, '38, p. 366).

Cleaning Filter Cloths

After filter cloths have been in regular service for a short period the spaces become clogged with calcium carbonate or calcium sulfate. These materials are formed when lime is added to the cyanide solution. The filtering rate begins to drop and plant throughout may be reduced if not corrected. A 5 per cent. solution of hydrochloric acid may be used to remove the calcium carbonate and a 5 per cent. solution of sodium hyposulfite ("hypo") to dissolve the calcium sulfate. In practice the hydrochloric acid is applied by a garden watering can as the filter is rotated slowly. The cloth is then scrubbed vigorously with a stiff brush to which a short handle is attached. After scrubbing a wash with water is given before the solution of sodium hyposulfite is slowly sprayed on. *Chemical Engineering & Mining Review,* Mar. 15, '38, p. 231.

Porous Hard Rubber

Porous hard rubber is produced by incorporating sulfur with a rubber composition in excess of that required to form hard rubber, and after vulcanization removing the excess free sulfur with perhaps other ingredients of the mix. Amount of sulfur varies in examples from 4 to 5 or more times the amount of rubber. The rubber is microporous, and the process may be applied jointly with other processes for making porous rubber as, *e.g.,* vulcanization of a wet mix, the incorporation of fibres or threads, wet or hydrated fillers, or gas bubbles, as by blowing or frothing. The sulfur solvent may be carbon disulfide, benzene, white spirit or alkali hydroxide. In an example, a 2 per cent. solution of sodium thiosulfate is used as a lubricant for a vulcanizing mold. Articles such as diaphragms or tubes for electrical, diffusion, or filtration purposes may be made of the porous ebonite so produced. E. P. 472,193, mentioned in *Chemical Trade Journal,* May 6, '38, p. 386.

New Use for Starch

The addition of starch to printing inks increases the set-off, and decreases the resistance to rubbing, especially when used on glazed or enamel finish paper. (*National Paint Bulletin,* May, '38, p. 10).

Possible New Textile Fiber

A chemical and mechanical treatment to remove the gum from ramie has been developed and may provide a new textile fiber.

Platinum-bearing Ore Discovered

Discovery of paying quantities of platinum-bearing ores in Southwestern Colorado has been reported by the Geological Survey. Officials said the find should pave the way to "new mineral activity" in the State, which in the past was one of the country's heaviest gold and silver producers. The deposit, first of any size found in the United States, lies in the La Plata mining district, twenty-one miles northwest of Durango, Colo. The platinum and a similar metal, palladium, were found in samples of high-grade copper ore, taken from a "glory hole" of an old working at an altitude of 10,250 feet between Bedrock and Boren Creeks on Copper Hill.

Binder for Prevention Offset

A recently reported patent uses, as a binder for preventing offset in printing, an alcoholic solution of gum arabic sprayed over sheets as they emerge from the press.

Synthetic Flyspray Base

A synthetic flyspray base capable of replacing a substantial proportion of the pyrethrins now used in household insecticides has been announced by du Pont. Compound, known as isobutyl undecylenamide, is an alcohol derivative combined with a vegetable oil derivative. Introduction of this compound as an improved ingredient for flyspray is significant in that not only has it been tested and proven as a compound extremely efficacious in the field for which it is intended, but it has also been carefully investigated for its possible poisonous effects upon those who may use it. Results of this toxicological investigation have shown that the compound is safe for use as a flyspray without fear of injurious effects to persons or household pets. Other less vital but important characteristics of a flyspray base, such as lack of objectionable odor and of staining fabrics and wallpaper, have been checked in the du Pont and outside laboratories and found satisfactory in the case of isobutyl undecylenamide.

Month's New Dyes

New General Dyestuff products include: Fastusol Blue LBL, which yields very bright blue shades on cotton, rayon, and silk. It possesses excellent fastness to alkali, acid and rubbing; levels very well and is easily soluble. It also is recommended because of its excellent dischargeability. Rapidogen Orange IGN is a new orange of excellent fastness properties with a very bright shade. In contrast to the older Rapidogen Orange G, this brand will not change shade in prolonged washing; it is also excellent to light and chlorine. Naphtamine Light Brown TWC Conc. is a direct dyestuff which produces on cotton as well as on rayon full shades of tobacco brown. It dyes good unions on cotton, rayon, wool and silk, and leaves acetate fibres very clear. Vegan Salt A is an auxiliary for dyeing mixed yarns and fabrics on spun yarn and wool, or cotton and wool. It prevents reduction by boiling, and also prevents gradual decrease in depth of rayon or cotton mixed with wool which occurs in longer boiling. Therefore, it produces a greater reliability in matching mixed fibres.

Chemical Specialties for Industry

A digest of new uses and new compounds

Cements and Putties for Chemical Equipment

By A. G. Wright

MANY chemical plants have an unfortunate way of developing cracks and crevices which give rise to leakage and consequent loss of valuable products. The number of compositions which can be mixed to meet various needs is a large one, and successful use demands care in preparation and application (*Chemical Age,* Apr. 23, '38; p. 317). In nearly all cases the ultimate success and permanence of the joint over a long period of time will depend very largely upon the method of mixing and applying the cement or putty, and upon allowing sufficient time to pass before the joint comes into contact with the chemical liquid which it has to resist. Failure is invariably due to premature exposure to working conditions, *i.e.,* a vessel lined with acid-resisting tiles can be put into operation too quickly after the lining operation has been completed; likewise liquid may be passed through a pipe line much too soon after sealing the joints in the sockets of the individual pipe sections. For repair work of a temporary character rapid setting cements and putties are fortunately obtainable, but it does not follow that such compositions may be used in making joints which are to be permanent over a long period of time and especially under fluctuating temperature, concentration of acid, etc.

Experience gained in the use of plant cements and putties gathered in the course of running a chemical works, will prove to be most valuable. Very little information has been published in correlated form for quick reference by the chemical engineer. A selection of certain cements and putties, some of which were used in chemical engineering practice in British explosive works from 1914 to 1918, has been published anonymously in England (*Ind. Chem.,* 1933, *9,* 381); others have been recorded in papers contributed to an American symposium (*Trans. Amer. Inst. Chem. Eng.,* 1927, *19,* 1). Useful compositions are also found in Perry's "Chemical Engineers' Handbook," 1934 (page 1,768) and Uhlmann's "Enzyklopaedie der technischen Chemie," 1930 (Vol. 6, page 553).

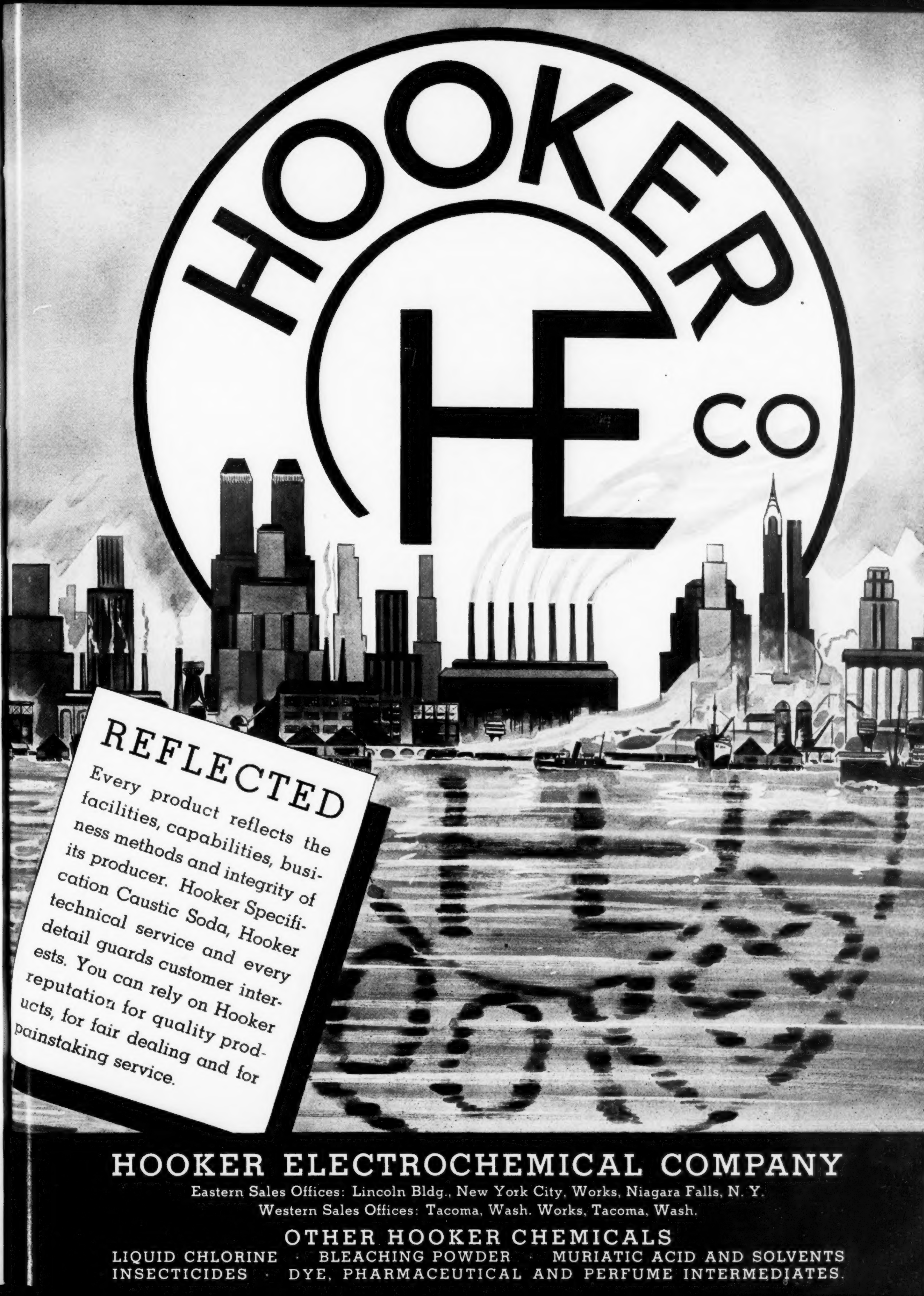
A solution of sodium silicate can be mixed with ground silica, asbestos fibre, pumice powder, clay, whiting, crushed brick or some similar material to provide a variety of acid-resisting cements. Such cements are generally slow setting, as when they merely set and harden by loss of water, but they can become quick setting if chemical reaction takes place between the silicate and one or more of the filler components. Subsequent modification is brought about by treating the hardened surface with an alkaline earth salt such as calcium chloride, or by treatment with sulfuric acid which converts the silicate into a tough insoluble gel. Mixed with asbestos fibre and asbestos powder to the consistency of a dough and subsequently washed with dilute sulfuric acid after setting, a solution of sodium silicate provides a good general purpose acid-resisting cement which can be used for setting acid-proof bricks, tiles, etc., and for making joints on plant units which are of chemical stoneware or fused silica. This type of cement can be used for sulfuric acid, nitric acid and also hydrochloric acid, but gives most satisfaction in the first two cases. If silica is used in place of the asbestos the cement acquires good refractory properties.

Silicate cements generally demand the use of a sodium silicate in which the ratio of Na_2O to SiO_2 is between 1 : 3.2 and 1 : 3.5, a solution of concentration equal to a density of 70° Tw. being preferable. Such cements must be used sparingly, the thinnest possible joints being essential when fixing masonry, tiles or brickwork. Ample time must always be allowed for hardening to take place; there must be no hurry in allowing the cement to come in contact with chemical liquids under working conditions. Where weak acid or salt solutions are to be handled, treatment with sulfuric acid after the cement has completely hardened becomes very essential, because a slight weakness is evident in the resistance of these cements towards water or weak aqueous solutions, especially at elevated temperatures, when unchanged sodium silicate will pass slowly into solution and a partial disintegration of the cement is possible.

Pumice powder, completely passing through a 30 B.S. screen, but of which 80 to 85 per cent. remains on a 100 B.S. screen and less than 5 per cent. passes a 120 screen, can be mixed with sodium silicate solution to give a cement which is very satisfactory for general use in contact with sulfuric acid, especially at a sulfuric acid plant. This cement can be used for bedding bricks or tiles in towers, and for the tile linings of reaction vessels generally, also for making joints on sulfuric acid concentrating plant. Where repairs have to be done any free acid must be neutralized and the repair surface dried as far as possible before applying the cement.

For nitric acid equipment a slow setting mixture of asbestos fibre and powder with sodium silicate solution is recommended. The most satisfactory joints are obtained by using asbestos which has been leached with acid and subsequently washed and heated to destroy chalky impurities. The mechanical strength of this type of cement may be increased by the addition of 10 per cent. pumice powder; the setting rate will be accelerated if 5 per cent. ground barytes is added. A rapid setting cement made by mixing finely ground barytes, or precipitated barium sulfate, with sodium silicate solution will provide a hard and mechanically strong cement surface for protecting an underlying mass of some softer putty or lute which is used for sealing the sockets of stoneware pipes. This mixture when set offers exceptionally good resistance against the action of wet chlorine gas, and it will also be found of general utility for repairing fractured stoneware vessels and pipes.

Ordinary silicate cements require from 70 to 100 lb. of sodium silicate solution for each 100 lb. of filler. Most mixtures take about seven days to attain a satisfactory degree of set by exposure to the air, but about thirty days will pass before the maximum strength is attained. This lapse of time is governed by the rate at which the water in the mixture evaporates, the temperature and humidity of the air being the main influencing factors. The need for quick setting mixtures has therefore caused a large number of proprietary brands to be introduced. These quick setting cements contain minor percentages of acid or of some material which gives an acid reaction in solution, the quick setting properties being acquired by the interaction of acid and silicate to yield colloidal silica or a gel in just the same way that ordinary silicate cement mixtures are hardened by washing the surface of the set cement with sulfuric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Every product reflects the facilities, capabilities, business methods and integrity of its producer. Hooker Specification Caustic Soda, Hooker technical service and every detail guards customer interests. You can rely on Hooker reputation for quality products, for fair dealing and for painstaking service.
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Eastern Sales Offices: Lincoln Bldg., New York City, Works, Niagara Falls, N. Y.
Western Sales Offices: Tacoma, Wash. Works, Tacoma, Wash.
OTHER HOOKER CHEMICALS
LIQUID CHLORINE · BLEACHING POWDER · MURIATIC ACID AND SOLVENTS
INSECTICIDES · DYE, PHARMACEUTICAL AND PERFUME INTERMEDIATES.

acid as mentioned earlier. Organic acids such as oxalic or stearic acids, or salts such as fluosilicates, are generally incorporated, but there are also basic types of cement in which hydroxides, such as aluminum hydroxide, are used to produce an insoluble silicate in the course of setting. Some of the proprietary quick setting cements of the acid type have to be applied within ten to fifteen minutes of mixing; basic types are generally workable for double this length of time. Such cements can usually be put into service within twenty-four hours of being mixed and applied. Ordinary silicate cements which are chemically cured by treatment with acid may often be used after a lapse of forty-eight hours, but as so much depends upon circumstances the chemical engineer will profit greatly by keeping a note of his experiences. A word of warning might be added in connection with the use of ordinary silicate cement for building up a structure with acid-proof brick, namely, that the work should not progress at a greater speed than four to twelve courses per day, depending upon the weight of the bricks or masonry, owing to the risk of squeezing the cement from the joints.

In cases where a non-rigid joint is necessary, as in sealing the sockets of stoneware pipes and in similar situations, there are several very useful putties which give good acid resistance and do not harden or crack under the influence of the weather. Litharge putty is made by mixing linseed oil (19 per cent.), litharge (73 per cent.), and flock asbestos (8 per cent.). It takes about seven days to set to moderate firmness, and is useful for equipment where nitric acid or hydrochloric acid is handled; at room temperature it gives good resistance to nitric acid up to a concentration of 56 per cent. Of more general interest is the fact that this litharge putty provides the best type of non-rigid joint for sealing the annular space at the joint between each section of a stoneware tower. A mixture of asbestos powder (50 per cent.), asbestos fibre (10 per cent.), China clay (12 per cent.), and boiled linseed oil (28 per cent.) provides a putty which is permanently soft to an even greater degree. It is resistant to cold nitric acid at all concentrations and is therefore very suitable for joints on the condensing system of a nitric acid plant, such joints being liable to prove troublesome. For stoneware and other joints which are in contact with hydrochloric acid, it will be found very satisfactory to use the stiff black putty made by mixing China clay (54 per cent.), dehydrated tar (38 per cent.), asbestos fibre (5 per cent.), and anthracene oil (3 per cent.). For bedding bricks and tiles in the construction of large tanks for hydrochloric acid, a thinner mixture composed of China clay (52 per cent.), dehydrated tar (28 per cent.) and anthracene oil (20 per cent.) is better.

Using a soft putty for sealing sockets upon equipment made of stoneware, fused silica and similar materials, the sockets are first plugged with asbestos cord and after filling in the putty the exposed surface should be finally sealed with a hard setting cement—applied in a thin layer—after allowing the putty to attain moderate firmness by exposure to the air for two or three days. It must be pointed out, however, that soft putties cannot be used in certain circumstances where the pipe-line or vessel will be working under a noticeable internal pressure, even when the exposed surface of the putty is finished with a hard setting cement, unless additional precautions are adopted.

Red lead cement which is suitable for acid resisting cast iron and all acid resisting metal to metal points is made by mixing red lead and glycerine to the consistency of a putty. This mixture must be applied thinly to the surfaces which are to be joined; it sets rapidly and is converted into a hard mass in the joint. For cases where a more slowly setting cement is needed it is possible to use a mixture of red iron oxide and boiled linseed oil. This mixture gives good resistance against sulfuric acid and hydrochloric acid up to 500° C. These two cements can also be used for making joints between iron and stoneware, or lead and stoneware. A mixture of litharge and glycerine provides another very useful type of cement, the characteristics of which can be changed by varying the proportions. The addition of water to the glycerine will hasten the speed of setting; with two parts of water to five parts of glycerine a mixture can be obtained which sets in ten minutes. The addition of whiting, silica or iron oxide gives a slower setting mixture, and if graphite is added, the joints to which the mixture is applied can be taken apart very easily. A mixture of litharge (5 parts), silica (3 parts), quartz flour (2 parts), and glycerine is very satisfactory for wet sulfur dioxide gas and hot sulfurous acid solutions.

A rubber putty made by mixing masticated rubber (1 part) with hot raw linseed oil (2 parts) and pipeclay (1 part) will be found useful where very flexible conditions are desirable. Portland cement mixed with rubber latex has been used as a bond between rubber and wood, or rubber and concrete, in the task of lining wood or concrete tanks with sheet rubber for the storage of hydrochloric acid and the handling generally of solutions containing hydrochloric acid. A preliminary coating of such a rubberized cement will make the rubber sheets adhere more firmly when the usual rubber cements are used as a means of providing adherence. Rubber cements are useful more especially for plant where hydrochloric acid is much in evidence; such cements, however, are unsuitable at elevated temperatures or in situations where oil vapors may be encountered. Chlorinated rubber, incorporated with certain organic solvents, provides mixtures which are notably resistant to the action of alkalies and to nitric acid up to a concentration of 42 per cent.

Incorporated with some inert filler, such as sand, sulfur makes a useful cement for use in the construction of acid towers and tanks, acid-proof floors and walls, metal pickling tanks, and in building chemical works drains. These sulfur cements are in a class by themselves. Below 95° C. they are resistant to sulfuric acid at all concentrations, nitric acid up to 45 per cent., and also to hydrochloric acid (except in the presence of large quantities of iron). Alkalines and oils, especially vegetable oils, are not tolerated. Strength depends upon the relative proportions of sulfur and sand, and also to a large extent upon the grading of the sand. A tensile strength of 400 lb. per sq. in. or more has been attained by a mixture containing 40 per cent. of sulfur, with the sand having 32 per cent. of voids. In making such a cement the mixture of sulfur and sand is heated to about 150° C. and well mixed to obtain an even distribution of the sand throughout the molten sulfur. The mixture is applied hot, but will be found rather stiff to use; working properties, however, can be improved by the addition of 2 to 5 per cent. of carbon black. The addition of carbon black also retards the settling of the sandy aggregate, and an increased strength is obtained for the cement when set. For instance, the tensile strength of a cement containing 70 per cent. of sulfur can be increased from 400 lb. per sq. in. to 660 lb. per sq. in. by replacing 5 per cent. of the sand with carbon black. Such a cement has excellent working properties and shows very little tendency for the sand to settle out. Certain organic sulfides which are soluble in molten sulfur can also be added for special advantages. Crushed pumice has been used in the place of sand, and particular characteristics with varying uses have been imparted by the addition of bitumens and fibrous materials. Iron filings and ammonium chloride can be added for use in jointing iron pipes, such cements having great strength due to the actual formation of iron sulfide in the sockets of the pipes. Used in the form of a thin film upon metal surfaces which are reasonably smooth, sulfur will sometimes give an adhesion strength equal to 900 lb. per sq. in.

The soaps of heavy metals when made into putties with linseed oil or some other drying oil provide a cement which is suitable for use in contact with hydrocarbon solvents. A mixture of dry white lead (3 lb.), white lead in oil (2 lb.), and 85 per cent. magnesia (1 lb.), with sufficient linseed oil to make up a stiff putty, will be found very satisfactory for the flanged and other joints upon plant where hot alcohol vapors may be causing trouble.

New Trade Marks of the Month

352,586. Kwik Products Co., San Antonio, Tex.; June 12, '34; metal and silver polish; use since Nov. 2, '32.

394,663. Bebe Lina Haddad (Wyp-A-Way Soap Co.), Cleveland, Ohio; June 29, '37; soap; use since Feb., '27.

395,771. Smooth-On Mfg. Co., Jersey City, N. J.; July 29, '37; iron compound in form of dry powder to repair defects and breaks in and make patches on iron and other metallic substances, etc.; use since Oct. 1, '29.

396,500. Metallic Coatings, Inc., Brooklyn, N. Y.; Aug. 17, '37; paints, varnish, enamel, and shellac; use since Aug. 13, '37.

396,501. Metallic Coatings, Inc., Brooklyn, N. Y.; Aug. 17, '37; paints, varnish, enamel, and shellac; use since Aug. 13, '37.

396,621. United States Gypsum Co., Chicago, Ill.; Aug. 20, '37; casting plaster composition; use since Jan., '34.

404,448. New Hampshire Diatomite Co., Portsmouth, N. H.; Mar. 24, '38; diatomaceous earth products for use in polishes; use since Jan. 6, '38.

398,470. Great Lakes Varnish Works, Inc., Chicago, Ill.; Oct. 14, '37; paint enamels; use since Feb. 21, '35.

399,630. Warwick Chemical Co., West Warwick, R. I.; Nov. 11, '37; textile and laundry detergents; use since Oct. 20, '37.

399,875. Atlas Powder Co., Wilmington, Del.; Nov. 18, '37; solutions of cellulose derivatives for coatings, etc.; use since Aug. 27, '37.

400,697. Nat'l Rosin Oil & Size Co., Savannah, Ga.; Dec. 10, '37; rosin oil; use since Nov. 3, '37.

401,316. Petroleum Solvents Co., Butler, Pa.; Dec. 28, '37; solvent naphtha used as cleaning fluid; use since Sept. 1, '35.

401,364. Ensign Products Co., Cleveland, Ohio; Dec. 30, '37; belt dressing and preserver; use since Sept., '12.

401,382. Foss & Company, Vineland, N. J.; Dec. 30, '37; paints, stains, paint waterproofing compounds, etc.; use since Dec. 4, '37.

401,842. Andrew Wilson, Inc., Springfield, N. J.; Jan. 12, '38; insecticide and fungicide; use since Mar. 15, '36.

401,467. Beck, Koller & Co., Detroit, Mich.; Jan. 3, '38; resins and resin solutions; use since Sept. 16, '37.

401,529. Gulf Portland Cement Co., Houston, Texas; Jan. 4, '38; masonry and Portland cement; use since Dec. 7, '37.

401,770. De-Fi-Al Roofing Co., Newark, N. J.; Jan. 11, '38; protective waterproof liquid coating in colors for walls, etc.; use since Jan. 6, '38.

401,904. Metallgesellschaft Aktiengesellschaft, Frankfort-on-the-Main, Germany; Jan. 14, '38; synthetic paint enamels; use since 1935.

402,111. George H. Barge, Jamaica, Long Island, N. Y.; Jan. 20, '38; cement for adhesively uniting leather articles; use since Dec. 19, '37.

402,432. Mouldrite, Ltd., London, England; Jan. 28, '38; synthetic resins; use since May 2, '34.

402,818. William Heggemeyer (Wil-Meyer Co.), N. Y. C.; Feb. 8, '38; liquid glass cleaner and polish; use since Feb. 5, '38.

402,945. I. F. Laucks, Inc., Seattle, Wash.; Feb. 11, '38; cold water paints and calcimines; use since Feb. 2, '38.

403,275. Monsanto Chemical Co., St. Louis, Mo.; Feb. 21, '38; chemical adjuvants to be added to motor fuels to improve their characteristics; use since Dec., '37.

403,023. Lester E. Thompson (Kleen-Et Products Co.), Mansfield, Ohio; Feb. 14, '38; soap product for cleaning painted walls, woodwork, linoleum, etc.; use since Feb. 1, '37.

403,077. B. F. Drakenfeld & Co., New York City; Feb. 16, '38; paint colors and dry enamels for use in ceramic industries; use since June 30, '37.

403,084. Intava, Ltd., London, England; Feb. 16, '38; lubricating oils and gasoline; use since Aug. 26, '37.

403,097. Semon Bache & Co., N. Y. City; Feb. 16, '38; adhesive mastic; use since Oct. 9, '37.

403,107. F. S. Webster Co., Cambridge, Mass.; Feb. 16, '38; carbon paper; use since Oct. 23, '37.

403,248. Farmo Fuel Corp., Shreveport, La.; Feb. 21, '38; gasoline and fuel oil; use since Jan., '38.

403,147. Phosphate Mining Co., N. Y. City; Feb. 17, '38; water softener; use since Feb. 11, '38.

403,166. Coal Tar Product Co., Brooklyn, N. Y.; Feb. 18, '38; roofing cement; use since June 1, 1900.

403,211. C. M. Kimball Co., Everett, Mass.; Feb. 19, '38; ammonia; use since May 19, '37.

403,178. Claude H. Hoover (C-Lite Products), Goshen, Ind.; Feb. 18, '38; liquid preparation for cleaning and polishing glass and metal; use since Aug. 19, '37.

403,258. International Filter Co., Chicago, Ill.; Feb. 21, '38; ion exchanging and adsorptive materials, in particular carbonaceous zeolites; use since Feb. 8, '38.

403,274. Monsanto Chemical Co., St. Louis, Mo.; Feb. 21, '38; insecticides, germicides, bactericides, fungicides, etc.; use since Dec., '37.

403,319. Martin H. Maeder (Kemi-Kulture Products Co.), Los Angeles, Calif.; Feb. 23, '38; chemicals for inducing and stimulating growth of plants, shrubs, and trees; use since Feb. 1, '38.

† Trade-marks reproduced and described cover those appearing in the *U. S. Patent Gazettes*, April 19 to May 17.

For Nickel Plating Solutions

Daconol is an alkyl aromatic sodium sulfonate possessing physical and chemical properties which make it of prime interest to the electroplating industries. It is made by S. A. Day Mfg. Co., Buffalo, N. Y. Daconol is highly soluble in acid, neutral, or alkaline solutions and is stable under all of these conditions. It is also stable to oxidation or reduction and hence, is not affected by being in solution along with hydrogen peroxide, potassium permanganate, sodium hydrosulfite, etc. It possesses strong wetting and emulsifying powers and, in very low concentrations, reduces the surface tension and interfacial tensions of solutions to a minimum. Due to the presence of Daconol in the nickel bath pitting does not have time to occur; it also reduces the tendency of dirt particles to adhere to the cathode. As a result, the plate mortality is reduced to a minimum, and a much more uniform grade of work is obtained.

"61"
403,329

ZAPONITE
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SHINIT
TRADE MARK
403,368

Dentglo
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FLURESIT
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DUROFLO
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Lanusa
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ELFOLITE
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JELLUBE
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RED ALECK
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CIBAGENE
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LYOPRINT
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MELOCOL
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MELOCOL
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MELOPAS
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IVALINE
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BASOL
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LIN-O-LAC
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NIACET
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LUMARITH
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BANISHEE
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AEROWAX
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KLU-KO
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AEROFELT
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STUCCOLITE
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HUMU-PHOS
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RAT LUNCHES
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FRISCH
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Gulfpride
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PHENACYL
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PHENALDEHYDE
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COLGATE
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FURALINE
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Seclarin
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Aversin
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Ceradolan
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ALKALEX
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CLEARCARB
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Aridye
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ZERONE
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SHACKLUBE
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403,329. Pratt & Lambert, Inc., Buffalo, N. Y.; Feb. 23, '38; varnishes, paint enamels, paints, putties, thinners, etc.; use since Jan. 1, 1894.

403,354. Atlas Powder Co., Wilmington, Del.; Feb. 24, '38; paints, enamels, and various paint products; use since Aug. 25, '24.

403,368. Seth Kimball, N. Y. City; Feb. 24, '38; cleaning preparation for dishes, silver, and metal; use since June 1, '37.

403,385. Fort Orange Chemical Co., Albany, N. Y.; Feb. 25, '38; cleansing powder for dentures; use since Jan. 11, '38.

403,387. American Fluresit Co., Cincinnati, Ohio; Feb. 25, '38; substance for rendering mortar and mortar-forming materials waterproof; use since May 14, '20.

403,388. American Fluresit Co., Cincinnati, Ohio; Feb. 25, '38; waterproofing compound for mortar and mortar-forming materials; use since May 14, '20.

403,392. W. H. Barber Co., Minneapolis, Minn.; Feb. 25, '38; lubricating oils and greases; use since Feb. 9, '38.

403,405. I. G., Frankfort-on-Main, Germany; Feb. 25, '38; artificial fibers; use since May 26, '37.

403,447. Ellis-Foster Co., Montclair, N. J.; Feb. 26, '38; synthetic resins; use since Dec. 15, '37.

403,455. James F. Larkin (Allied Earthen Prods. Co.), Oklahoma City, Okla.; Feb. 26, '38; insulating mud and mud jells for leak-proofing earthen storage pits and sumps; use since June, '36.

403,456. James F. Larkin (Allied Earthen Products Co.), Oklahoma City, Okla.; Feb. 26, '38; drilling mud; use since Mar., '37.

403,474. Society of Chemical Industry in Basle, Basel, Switzerland; Feb. 26, '38; coal tar colors; use since Aug. 6, '37.

403,475. Society of Chemical Industry in Basle, Basel, Switzerland; Feb. 26, '38; auxiliary agents for textile industry; use since Nov. 15, '37.

403,476. Society of Chemical Industry in Basle, Basel, Switzerland; Feb. 26, '38; glues, adhesives, and binding agents, composed principally of synthetic resins; use since Nov. 5, '37.

403,477. Society of Chemical Industry in Basle, Basel, Switzerland; Feb. 26, '38; synthetic resins, molding or casting compositions, tanning agents, lacquers, varnishes, and textile assistants; use since Nov. 5, '37.

403,478. Society of Chemical Industry in Basle, Basel, Switzerland; Feb. 26, '38; glues, adhesives, and binding agents, composed principally of synthetic resins; use since Nov. 5, '37.

403,479. Society of Chemical Industry in Basle, Basel, Switzerland; Feb. 26, '38; synthetic resins; molding or casting compositions, tanning agents, lacquers, varnishes, and textile assistants; use since Nov. 5, '37.

403,483. Upland Products Co., Winona, Minn.; Feb. 26, '38; lubricating oils, use since Nov. 20, '37.

403,491. Basol Labs., Inc., Greenville, S. C.; Feb. 28, '38; solvent paste for washing painted surfaces; use since Aug., '31.

403,528. Star Chemical Co., Chicago, Ill.; Feb. 28, '38; compound for coating linoleum; use since Jan. 1, '35.

403,555. Niacet Chemicals Corp., Niagara Falls, N. Y.; Mar. 1, '38; industrial chemicals; earliest use since July 20, '37.

403,638. Celluloid Corp., Newark, N. J.; Mar. 3, '38; plastic material in form of foils or films; use since Feb. 21, '38.

403,684. James A. Haines (Haines Products Co.), Carey, O.; Mar. 4, '38; deodorants; use since Feb., '34.

403,704. Midway Chemical Co., Jersey City, N. J.; Mar. 4, '38; wax polish; use since June 30, '32.

403,707. I. Putnam, Inc., Elmira, N. Y.; Mar. 4, '38; preparations for cleaning artificial dentures; use since Feb. 17, '38.

403,726. Johns-Manville Corp., N. Y. City; Mar. 5, '38; heat insulation material; use since Jan. 7, '38.

403,728. I. F. Laucks, Inc., Seattle, Wash.; Mar. 5, '38; calcimines and inside and outside cold water paints; use since Feb. 24, '38.

403,805. Virginia Carolina Chemical Corp., Richmond, Va.; Mar. 7, '38; fertilizers; use since Feb. 5, '38.

403,825. Alfred A. Osten (Rat Lunches Co.), Carroll, Iowa; Mar. 8, '38; vermin exterminator for rats and mice; use since Sept., '33.

403,863. Frisch & Co., Inc., N. Y. City; Mar. 9, '38; paint; use since Jan. 1, '35.

403,868. Gulf Oil Corp., Pittsburgh, Pa.; Mar. 9, '38; lubricating oils; use since Nov. 15, '35.

403,875. Phoenix Color & Chemical Co., Paterson, N. J.; Mar. 9, '38; dyestuffs; use since Jan. 2, '36.

403,876. Phoenix Color & Chemical Co., Paterson, N. J.; Mar. 9, '38; dyestuffs; use since Feb. 19, '38.

403,990. Colgate-Palmolive-Peet Co., Jersey City, N. J.; Mar. 12, '38; glycerin; use since Feb. 1, '37.

403,984. Betzold Fur Cleaners, Phila., Pa.; Mar. 12, '38; preparation for softening furs and fur garments; use since May 8, '36.

404,111. Bohme Fettchemie-Gesellschaft M. B. H., Chemnitz, Germany; Mar. 16, '38; chemical dye aids; use since Jan. 26, '38.

404,112. Bohme Fettchemie-Gesellschaft M. B. H., Chemnitz, Germany; Mar. 16, '38; chemical dye aids; use since Jan. 26, '38.

404,114. Bohme Fettchemie-Gesellschaft M. B. H., Chemnitz, Germany; Mar. 16, '38; chemical dye aids; use since Jan. 26, '38.

404,200. C. F. Burgess Labs., Inc., Chicago, Ill.; Mar. 18, '38; granular material for softening and conditioning water; use since Feb. 26, '38.

404,236. Texas Company, N. Y. City; Mar. 18, '38; lubricating oils; use since Feb. 25, '38.

404,280. E. I. du Pont de Nemours & Co., Wilmington, Del.; Mar. 18, '38; fertilizers; use since Mar. 1, '38.

404,360. General Chemical Co., N. Y. City; Mar. 22, '38; insecticides; use since Feb. 9, '38.

404,410. Keasbey & Mattison Co., Ambler, Pa.; Mar. 23, '38; magnesia carbonate; use since Mar. 1, '38.

404,444. Kilgore Development Corp., Washington, D. C.; Mar. 24, '38; insecticide and insectifuge; use since Nov. 23, '36.

404,462. Aridye Corporation, Fair Lawn, N. J.; Mar. 25, '38; textile printing pastes and printing colors; use since Sept. 8, '37.

404,483. Patterson-Sargent Co., Cleveland, Ohio; Mar. 25, '38; paints, enamels, stains, lacquers, and varnishes; use since Jan. 26, '38.

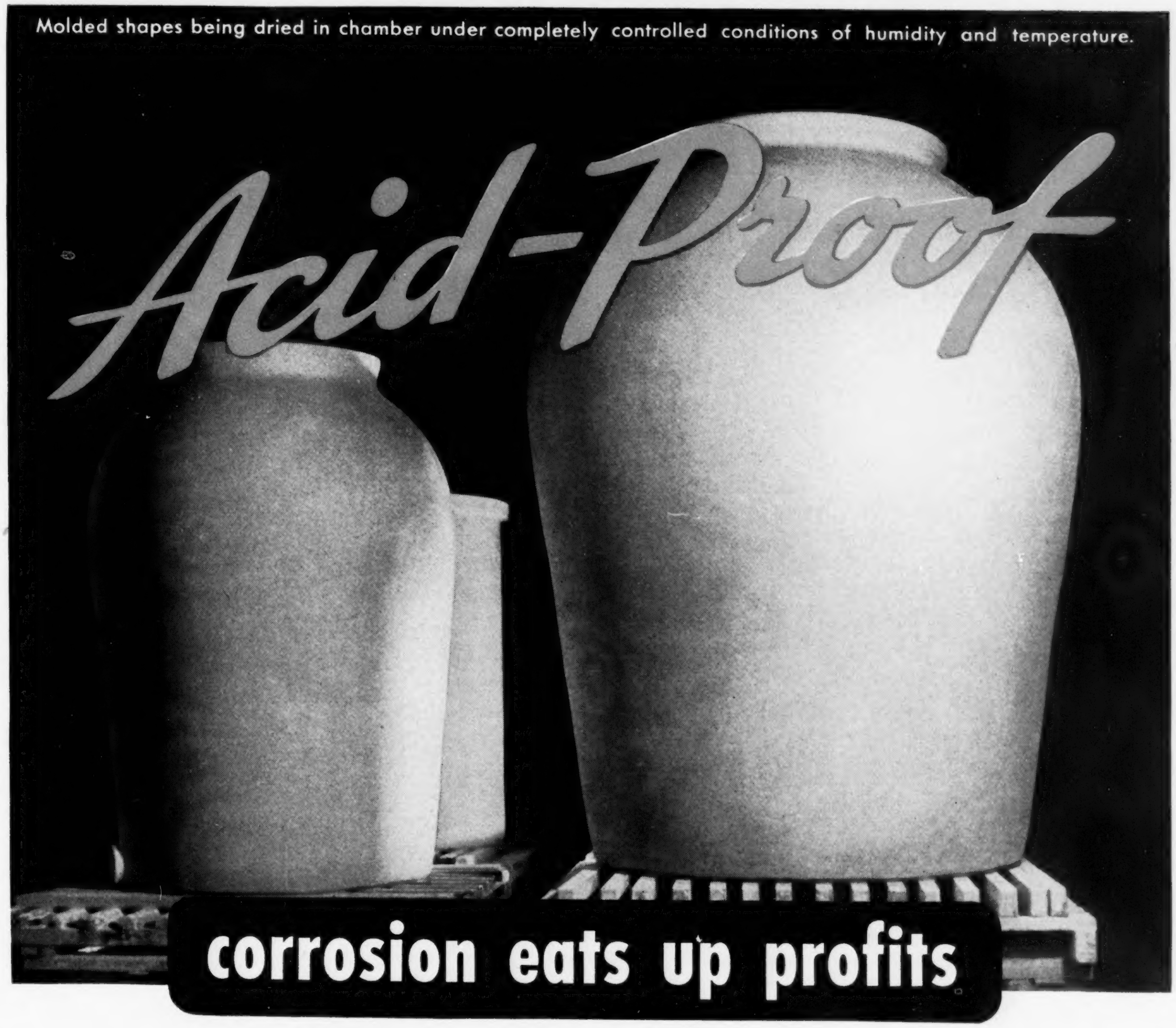
404,493. Sears, Roebuck & Co., Chicago, Ill.; Mar. 25, '38; lubricating oil; use since Oct. 31, '37.

404,559. American Bitumuls Co., Wilmington, Del., and San Francisco, Calif.; Mar. 28, '38; asphalt emulsions and compositions; use since Mar. 4, '38.

404,587. James A. Smith, Phila., Pa.; Mar. 28, '38; soap in cake and powder form; use since Mar. 1, '38.

404,674. E. I. du Pont de Nemours & Co., Wilmington, Del.; Mar. 30, '38; synthetic methanol for use as an anti-freeze; use since July 1, '33.

404,750. A. Raymond Davis (Oilless Shacklube Labs.), Chicago, Ill.; Apr. 1, '38; lubricant; use since Nov. 22, '37.



General Ceramics Acid-Proof Stoneware will banish corrosion and contamination *Permanently*

When corrosion and product contamination creep in, costs go up . . . profits go down.

General Ceramics Chemical Stoneware is ACID-PROOF both in glaze and body. All industrial acids . . . hot or cold, dilute or concentrated, excepting only hydrofluoric acid . . . can be handled efficiently and economically with this ware. Spoiled batches become a thing of the past and plant efficiency is increased when General Ceramics Acid-Proof Chemical Stoneware is installed.

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POISON
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NEW YORK, N.Y.
SELLING AGENTS

Elon H. Hooker

1869-1938

Said Elon Hooker:

"Liberty is the most precious, the most expensive, and the most productive power in the world. It cost a thousand years of bloody struggle and unnumbered millions of lives to attain it for a short century and a half in the western world—a mere moment in the history of man. Let it not prove true, as has been said, that the hands and hearts of those who inherited it have been too feeble and faithless to hold it and too poor in spirit to pay its inescapable unkeep."

Thus he summed up, when dedicating a group of laboratories at Rollins College a year ago, the thoroughgoing Americanism of his ideals and his accomplishments. No chemical industrialist of our time entered more fully into public life than he, for since 1899, when he was Deputy Superintendent of New York State Public Works, under Governor Theodore Roosevelt, he has been treasurer of the Progressive National Committee; candidate for the governorship of New York; and has served as Chairman of the American Defense Society, on the Executive Committee of the Roosevelt Memorial Association, and as Trustee of the University of Rochester. Founder of the Hooker Electrochemical Company, he was a distinguished public servant also to the industry. He served three terms as president of the Manufacturing Chemists' Association, was chairman-director of the Research Corp., and of the National Industrial Conference.

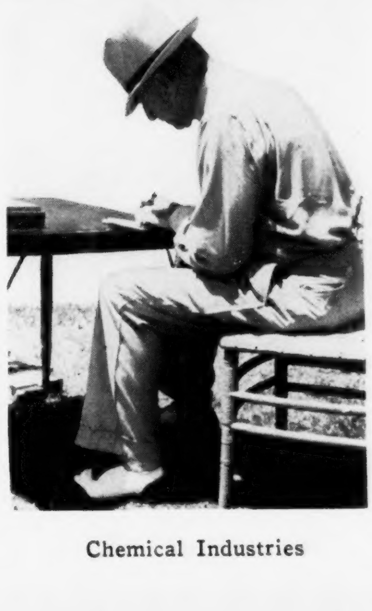
Driven to the then frontier of America by a pioneering spirit and a love of personal independence, just three hundred years ago, his direct ancestor, Thomas Hooker, left Massachusetts and founded on the Connecticut River the city of Hartford.

In the death of Elon Hooker we have lost a modern epitome of that pioneering, liberty-loving independence, and the chemical industry loses one of its most courageous, colorful leaders.

The Hooker Homestead at Rochester, N. Y.

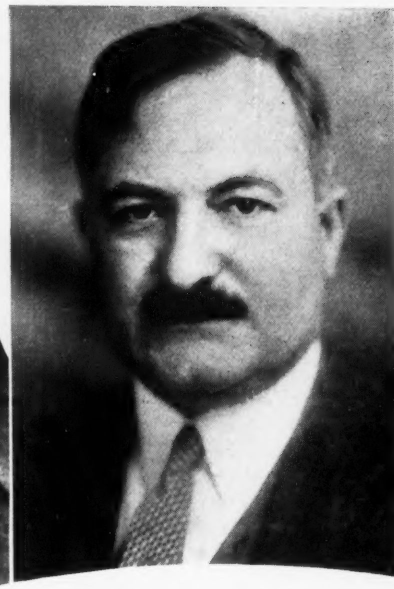
Below: in 1915. Center: in 1937.

In 1920: candidate for Governor of New York State.



Tomorrow Advanced chemical engineering students of Virginia Polytechnic Institute en route on their annual chemical plant study trip. Two trips are scheduled each year. One for the juniors of three or four days duration, making a thorough study of the processes, operation, and equipment of leading chemical industries in the South. Later in the senior year, students are conducted on a week to ten day trip through the eastern states. The trips have been under the direction of Dr. Albert H. Cooper, Associate Professor, Chemical Engineering.

Back in the dim, dark ages, when good beer was an illicit joy, this group of young huskies, members of the Salesmen's Association, hied themselves down to Long Island, for an outing. It's almost as good as going back to a college reunion, to see the "changes time hath wrought" in face and fame and fortune, and we offer a copy of the *Chemical Who's Who* as a prize to the first man who identifies every man in cameraman Carl Hazard's twenty years ago candid shot. **Yesterday**


Headliners at the recent meeting of the American Institute of Chemical Engineers, held at White Sulphur Springs. Left to right, Fred C. Zeisberg (du Pont), president of the Institute; Dr. Harry A. Curtis (chief chemical engineer, T.V.A.); J. N. Compton (Carbide & Carbon), in charge of arrangements for industrial plant visits in Charleston area.

To correct an error made last month, when the captions under these two well known sales executives were inadvertently transposed: Mr. Camp is below, and Mr. Doan at the right.

Friday, May 20th, was Research Day in New England, and under the New England Council state meetings were held throughout the section. At Hartford the program was well spiced with chemistry and at the head table were: left to right, Dr. Charles T. La Moure, Mansfield State Training School; Prof. C. C. Furnas, Yale; Williams Haynes, Chemical Industries; Dr. Harrison E. Howe, *Industrial & Engineering Chemistry*; J. Carleton Ward, Jr., Pratt & Whitney Aircraft, and Dr. Wm. J. Hale, Dow Chemical.

M.C.A. DENOUNCES TRADE PACTS

Executive Committee Reports at 66th Annual Meeting at Skytop—E. M. Allen Reelected President—Favorable Employment Record of the Chemical Industry Revealed—

Trade pacts, growing Japanese industrialization and subsidized low cost chemical manufacture, and employer-employee relations were among the more important topics which engaged the attention of the leading chemical executives gathered at Skytop, Pa., for the annual meeting of the Manufacturing Chemists' Association on June 2 and 3. E. M. Allen, president, Mathieson Alkali, and president of the M.C.A., presided at the meetings which were the 66th in the series. Informal discussions also centered on various aspects of foreign trade, the national political situation, and the immediate outlook for business. Another group devoted a major part of its time to transportation and container costs, and to the problems arising from the use of new chemicals of a toxic character. As usual, the M.C.A. played host to the members of the Synthetic Organic Chemical Manufacturers Association at the union dinner, held on June 2. The concluding feature of the business sessions was the showing of the du Pont film, "The Wonder World of Chemistry."

Report of the executive committee on trade agreements, read by H. L. Derby, president, American Cyanamid & Chemical, and adopted by the Association, declared that the indirect effects of this policy are as harmful to the chemical industry as its direct implications. The report said:

"From the viewpoint of the chemical industry as a whole it is believed that the benefits received have not compensated for the concessions granted by the U. S. to foreign countries. It is important to emphasize that the indirect effects of these agreements are more important to the chemical industry than the actual direct effects from a reduction in chemical rates in the Tariff Act of 1930, that is to say, concessions granted by the U. S. resulting in increased imports of textiles, ceramics, leather and other products into which chemicals enter as raw materials, curtail the home market for the output of the American chemical industry.

"The pending agreement with the United Kingdom, and with that government on behalf of Newfoundland and the British Colonial Empire, is the most important agreement under consideration to date. Great Britain produces a full line of industrial products, and after the inevitable let-up of the present war boom, dumping from their surplus capacity on the world markets may be anticipated. At the public hearings on the agreement with the United Kingdom, opposition by labor was significant.

"Furthermore, any reduction in our tariff automatically extends to all nations, unless the President should, by proclamation, exclude these benefits to a nation, due to discrimination against our commerce, as in the case of Germany. In practical language this means that a tariff cut conceded to any European nation is available to Japan. The growing export trade of Japan has recently been retarded due to her conquest in China, but Japan, with her subsidized low-cost chemical industry, is becoming a real factor in the international chemical trade.

"The present capacity of the Japanese rayon industry occupies the first place among the world nations."

Comprehensive Study of Employment

The executive committee also submitted a detailed report on the subject of employment in the chemical field which will be distributed later to members of the Association. Included are 42 tables revealing considerable new and heretofore unpublished statistics. In the report the committee states:

"The high continuity of employment in our industry during 1936 is indicated by the fact that over 85 per cent. of the total employees covered by this inquiry worked fifty weeks or more during the entire year. In the payroll period in April, 1937, 81 per cent. of all factory employees were on a forty-hour week.

"It takes an average investment of $11,250 for each job in a chemical plant, or figured for 'all chemical employees,' both factory and nonfactory, it requires $8,156 per employee divided as follow:—$5,223 for capital assets and $2,933 for working capital. These figures are based upon data covering a total investment of over $912,000,000."

Allen Again Heads M.C.A.

President E. M. Allen was elected to head the Association for another year. Elected with Mr. Allen as president were: George W. Merck, Merck & Co., and Charles Belknap, Monsanto Chemical Co., vice-presidents; J. W. McLaughlin, Carbide & Carbon Chemicals Corp., treasurer, and Warren N. Watson, Washington, secretary.

Following executive committee also was elected: H. L. Derby, chairman; Charles W. Millard, General Chemical; Leonard T. Beale, Penn. Salt Manufacturing; J. H. Dunbar, du Pont; Clyde D. Marlatt, Martin Dennis; Lammot du Pont; August Kochs, Victor Chemical Works; William B. Bell, American Cyanamid; R. N. Chipman, Chipman Chemical; Russell H. Dunham, Hercules Powder, and Charles S. Munson, U. S. Industrial Alcohol.

Crass, New Assistant to Watson

It was also announced that M. F. Crass, Jr., has been chosen by the executive committee to assist secretary Warren N. Watson in the Washington offices of the Association.

Roosevelt Seeks Study of Phosphates

Long-delayed Message to Congress Suggests Congressional Investigation as Basis for Legislation to Conserve Resources and to Develop Western Supplies—Fertilizer Industry Points Out Diminishing Exports of Rock—

President Roosevelt on May 20 recommended a thorough Congressional investigation of "phosphate resources, their use and service to American agriculture," as a basis for legislation next session for the conservation of domestic supplies.

In the long-awaited message on the subject of phosphates sent to the House, the President said that the phosphate situation offered a national problem closely related not only to agriculture and soil conservation but also to the physical health and economic security of the people.

"It is," he declared, "high time for the nation to adopt a national policy for the production and conservation of phosphates for the benefit of this and coming generations."

In his message the President advised that the U. S. probably has the largest deposits of any other country in the world. Of a total of 17,200,000,000 tons of known deposits throughout the world, 7,200,000,000 are located in the U. S. "Although 90.8% of domestic deposits are located in Western States," he added, "Florida and Tennessee deposits, which contain less than 10% of the nation's supply, are furnishing more than 97% of all the rock used for domestic agricultural purposes.

"It is hardly necessary to emphasize the desirability of conserving those deposits to the fullest extent for the benefit of agriculture in the East, the South and a considerable portion of the Middle West," he said. After discussing deposits in the country and their location, the President said exports of phosphate rock were almost entirely from Florida. Because of the importance of conserving these deposits in the East, he continued, serious attention therefore should be given to the development of Western deposits because "it is evident that our main reliance for an adequate supply of phosphate must eventually be placed on our Western deposits."

Asks Government Investigation

"The disposition of our phosphate deposits should be regarded as a national concern. This situation appears to offer an opportunity for this nation to exercise foresight in the use of a great national resource heretofore almost unknown in our plans for the development of the nation.

"I invite especial attention of Congress to the very large percentage of known phosphate rock which is on Government owned land—probably three-quarters of the whole supply, and to the fact that the Eastern supply, while in private ownership, is today being exported in such quantities that when and if it is wholly depleted, Eastern farms will have to depend for their phosphate supply on the Far Western lands."

Identical resolutions were introduced in both houses on May 23 by Senator James P. Pope (Dem., Idaho) and Representative Compton I. White (Dem., Idaho) calling for creation of a joint 6-man Congressional committee to investigate the phosphate resources.

Fertilizer Industry Objects

The fertilizer industry has taken issue with certain portions of the President's statement on phosphates, particularly pointing out that with 450,000,000,000 metric tons in the deposits of North Africa handy to Europe, with recent discoveries of additional deposits on Japanese islands, Japan being one of our chief customers, and with increasing use for agricultural purposes, the export fraction will necessarily dwindle in spite of our best salesmanship to retain even a modest market, and our known high-grade deposits of more than 7,000,000,000 tons are sufficient to supply every possible need for from 1,500 to 2,000 years.

The fertilizer industry also has taken exception to much of the speech delivered by Dr. Harry A. Curtis, chief chemical engineer for T.V.A., at the recent American Institute of Chemical Engineers' meeting at White Sulphur Springs, W. Va., in which he claimed that many farmers were forced to borrow money from banks which have ownerships in mixing plants, and therefore were not free to pick and choose their sources of supply.

Report of Federal Experts

Reserves of phosphate rock in the U. S. are "enormous" and likely to last over 91,000 years at the present rate of production, according to Bertrand L. Johnson and K. G. Warner, Federal experts, writing in the Minerals Year Book of the Bureau of Mines.

The 20-page advance print, released by the Bureau, was regarded in some quarters as challenging the suggestion of a possible phosphate shortage contained in the special message.

Williams, Kitchel Head Charity Drive

Freeport Sulphur President to Solicit Gifts from Firms; Kitchel, Binney & Smith President in Charge of Employee Groups—Bogert Receives New Honors—Moore, New President, Am. Inst. of Chemists—Chemical Fund, Inc., New Investment Trust Announced—

Two committees have been formed in the chemical industries to cooperate in the '38 campaign of the Greater New York Fund for contributions of $10,000,000 to supplement finances of private welfare and health agencies.

One of these committees, headed by Langbourne M. Williams, Jr., president of Freeport Sulphur, will solicit gifts of firms in the industry. J. Tyler Claiborne, Jr., vice-president of Freeport Sulphur will be vice-chairman. The second committee, with Allen F. Kitchel, president of Binney & Smith Co. as chairman, will canvass employee groups.

The selection of Mr. Williams as chairman of the industry's committee in New York's first united appeal for business and employee support of welfare and health agencies marks his emergence as a new leader in New York's philanthropic affairs. Thirty-five years of age, he came to the metropolis a few years ago from Richmond, Va., where he was known as a vigorous worker in behalf of many civic and charitable causes.

In addition to his responsibilities with Binney and Smith, Mr. Kitchel is a director of Columbian Carbon, the L. Martin Co., the W. C. Hardesty Co., and the Sound Beach Trust Co. He served in '37 as chairman of the chemical industries division of the New York World's Fair Bond Sales Committee.

Moore Heads A. I. C.

At the annual meeting of The American Institute of Chemists, Robert J. Moore, development manager, Varnish-Resin Division, Bakelite, was elected president, succeeding Dr. Maximilian Toch. Mr. Moore, formerly of the faculty of chemistry of Columbia is also chairman-elect of the North Jersey Section of the A. C. S.

Other officers elected at the annual meeting held at Atlantic City were vice-president—Dr. Joseph W. E. Harrisson, consulting chemist of Philadelphia; Secretary—Howard S. Neiman, editor and patent attorney of N. Y.; treasurer—Bush H. Knight of Knight & Clark, N. Y. City; Councillors—Dr. William T. Read, Dean of Chemistry of Rutgers University; Dr. Gustav Egloff, director of the Universal Oil Products Company of Chicago; Dr. Norman A. Shepard, director technical service, American Cyanamid. Other councillors are: Frank G. Breyer of N. Y. City; Dr. Neil E. Gordon, chairman of the Department of Chemistry, Central College, Fayette, Mo.; Dr. Allen Rogers, head of Dept. of Chemical Engineering, Pratt Institute, Brooklyn, N. Y.; Dr. Ross A. Baker, professor of Chemistry, College of the City of N. Y.; Dr. Gerald Wendt, director, The American Institute of New York City; and Dr. Lloyd Van Doren, consultant and patent attorney of N. Y. City.

Bogert Priestley Medalist

Prof. Marston Taylor Bogert, for 44 years a member of the Columbia University faculty and one of the nation's leading synthetic organic chemists, has been awarded the Priestley Gold Medal, highest honor of the A. C. S., "for distinguished service to chemistry." Medal, bestowed every 3 years, was established in 1923 in honor of Joseph Priestley, who discovered oxygen in 1774. Priestley, a native of England, came to America because of hostility toward his views as a nonconformist preacher. He lived in Philadelphia and Northumberland, Pa.

Prof. Bogert, who last week addressed the 10th International Congress of Chemistry in Rome, and attended the joint meeting of the Congress and the 13th Conference of the International Union of Chemistry as an official delegate of the U. S. Government, will receive the medal at the 96th meeting of the Society in Milwaukee, Wis., Sept. 5 to 9. Prof. Bogert has also just been elected president of the International Union of Chemistry.

Chemical Fund, Inc., Formed

Williams Haynes, publisher of Chemical Industries, has been elected a director of Chemical Fund, Inc., an investment company of the management type. Company has only one class of shares with no bonds or debentures. F. Eberstadt & Co., Inc., N. Y. City, is named in the SEC registration statement as distributor of the shares. The shares are to be offered initially at $10 per share. Arthur D. Little, Inc., Cambridge, Mass., has been retained as consultant on the technical aspects of the chemical industry, to assist in evaluating trends in the chemical field and in selecting the most desirable companies for investment.

The Gangplank

Nelson Littell sailed on June 1 for a two months visit to Germany on business for American Hyalsol Corp. and where he will attend to other patent matters. He was accompanied by his son, Nelson Littell, Jr., who is a student in chemical engineering at Penn. State.

N. A. I. D. M. Expects 250 at Summer Meeting

Final Plans Laid for Insecticide and Disinfectant Meeting at Lake Wawasee, Ind., June 13-15—Soap Sales Reported—Rosendahl, Glyco, to Tour Europe—

The 24th Summer Meeting of the National Association of Insecticide and Disinfectant Manufacturers, Inc., will be held at Lake Wawasee, Ind., June 13, 14 and 15. Numerous well known speakers on marketing and technical problems of the manufacturers of insecticides, disinfectants and sanitary specialties will be heard. New and revised specifications and testing methods for both insecticides and disinfectants will come up for discussion and approval.

J. L. Brenn, Huntington Laboratories, Inc., Huntington, Ind., is president of the association and will preside at the convention. John Powell, John Powell & Co., N. Y. City, is chairman of the general convention and arrangements committee. Program will be in charge of W. J. Zick, Stanco, Inc., N. Y. City.

A rather elaborate entertainment program has been planned under the direction of Robert S. Solinsky, National Can, Chicago. Business sessions will be held each morning and the afternoons will be given over to golf and other recreation. The Annual Golf Tournament of the association will be held on Monday, June 13. The anticipated attendance at this meeting is 250 representatives of leading manufacturers of insecticides, disinfectants and allied products.

Soap Sales Favorable

Tonnage sales of soap by 81 manufacturers in the U. S. in the quarter ended Mar. 31, showed a gain of 37.1% over previous quarter, and were 11.3% above average quarterly sales since 1935, according to figures compiled by Association of American Soap and Glycerine Producers, Inc.

Dollar sales in March quarter were 23.9% above the previous 3 months, 18.2% over average quarterly dollar sales and were 8% under March quarter of 1937, in which dollar sales of $72,310,678 were the largest in any quarter since 1935.

Federal Trade Commission

Mineral Plant Food Co., 26 Wall st., Orlando, Fla., has entered into a stipulation with the Commission to discontinue certain misleading representations concerning Phoscaloids, a colloidal phosphate product for use as a plant food. Respondent company agrees to cease advertising, when such are not the facts, that its product has been subjected to 3,000 or to any other specified number of field tests, and that it contains "rare" mineral elements, implying that such mineral elements are other than those found in varying proportions in practically all soil in the U. S.

Lever Brothers Co., Cambridge, Mass., has entered into a stipulation under which it agrees to cease certain misleading representations in the sale of Lifebuoy Soap, Lux Flakes and Lux Toilet Soap.

A stipulation to discontinue false and misleading advertising has been entered into with the Commission by Northwestern Fuel Co., 1st National Bank Bldg., St. Paul, Minn., engaged in selling a product known as Chemacol Processed Coal.

Du Pont Pushes Specialties

The biggest du Pont auto polish newspaper and magazine advertising campaign is breaking currently, featuring a much wider use of newspapers than heretofore. The newspaper schedule has a combined circulation of more than 10,000,000. This is supplemented by a national magazine list with a circulation of 7,000,000. Copy theme is speed and ease of application and is based on the results of a copy test recently conducted in three representative cities. The campaign is divided between No. 7 Duco Polish and a new liquid auto polish called Speedy Wax.

News of the Spec. Companies

The Sci-Eff-Ec Laboratories, W. 117th st. and Madison ave., N. W., Cleveland, is a new firm making boiler compounds and cleaning materials.

Shell Union Oil, N. Y. City, has added 3 new products to its line of specialties: Shell Furniture Polish, Shell No-Rubbing Floor Wax and Shell Glass Kleanzit.

Morland Chemical, Bellaire, Ohio, is a newcomer in the specialties field. Morris Lando is president.

Bonwit-International Co., 110 W. 40th st., N. Y. City, is now Eastern representative for the Grapho Products, Inc., Indianapolis.

The Prim Corp., St. Louis, is introducing "Prim"—a liquid cleanser for painted and enameled surfaces.

The Sanito Chemical Co., Fletcher, Ohio, has been formed to make a general line of sanitary chemicals.

American Chemical Service Co., Hammond, Ind., suffered a severe fire loss on May 12. Loss was $100,000.

The Manhattan Paste & Glue Co. will consolidate its N. Y. City and New Jersey plants in a new plant in Brooklyn located at Greenpoint and Kingsland aves.

The Kimia Laboratories, Clifton, N. J., manufacturer of shoe polishes and rubber cements, was damaged slightly by fire on May 19.

Ward Chemical, 920 S. Main st., Tulsa, has expanded its warehouse facilities.

Ansbacher Siegle's insecticide plant in Brooklyn was damaged by fire on May 14.

News of the Specialties

As we go to press we learned that the suit of the American Cubé Syndicate, Inc., against Agacide Labs., Inc., Milwaukee, Wis., alleging violation of the Dennis patent on the special application of Cubé in extract or powdered form was decided in favor of the plaintiff in the U. S. Federal District Court, Milwaukee.

Rosendahl to Sail

Edward Rosendahl, vice-president and general manager of Glyco Products, 148 Lafayette st., N. Y. City, is leaving for a business trip to Europe in the *Ile de France* on June 22. He will visit the Glyco Products Co.'s representatives, Marcel Quarre et Cie in Paris, Rex Campbell & Co., Ltd. in London, Industrie Grondstoffen Maatschappy N. V. in Rotterdam and E. Landerholm in Stockholm, with a view of obtaining first hand information on the European market.

New Tex. Specialty Firm

Piedmont Color and Chemical Co., with Fred E. Wilson as president and John Franklin, vice-president and chemist, has opened a plant at High Point, N. C., for the manufacture of oils and finishes, liquid chlorine and other specialties for the textile trade.

Magnus Appoints

Three new appointments have been announced by Magnus Chemical, Garwood, N. J. Alfred L. Gough becomes resident sales representative in Rhode Island, Jas. J. O'Keefe becomes resident sales representative covering Virginia and Linwood D. Knight will represent Magnus in N. H. All three men have had wide experience in the industrial field.

Forms New Union

Organized "to promote industrial relations and collective bargaining between employes and employer by creating and establishing groups to represent the employes," the Employes Association of the Richards Chemical Works, Inc., of Jersey City, has filed a certificate of incorporation.

Kaas Joins Crown Oil

Sylvester R. Kaas has joined the staff of Crown Oil Products Corp. of Long Island City as their staff director, after having been formerly associated with the Atlas Refinery, Inc., in the same capacity.

Demand for Industrial Chemicals Improves

Inventories Reported at Low Point Requiring Replacement Orders—Copper Salts Reduced When Copper Goes to 9c—Competition in Aluminum Sulfate Forces Decline—Lead Acetate at 10c—Potassium Cyanide Quoted 5c Lower—Elon H. Hooker Dies on Pacific Coast—

Heavy Chemicals

A very moderate improvement in the movement of industrial chemicals into consuming channels was noted in the past month. The betterment could hardly be attributed to any marked advance in the rate of business activity, but did reflect a condition where inventories in many cases had reached the state where replenishment was necessary to take care of the restricted manufacturing operations now prevailing. If this is really the explanation then the outlook is brighter than it has been for several months, particularly so because the usual seasonal trend is downward at this period of the year. Purchasing on spot was generally for relatively small quantities, and this was equally true where shipping instructions were issued against existing contracts. There is little hope in the trade that any sudden expansion in demand will occur during the summer period, but definitely a slightly better sentiment was noticeable.

A number of important price changes were reported in May, the overwhelming majority of them being on the downward side. Most of the reductions were tied into further declines in the major metals. Copper weakened last month and finally sank to a 9c level. A readjustment of the copper salts naturally followed. Copper sulfate was reduced ¼c to a $4.00 level, although oddly enough producers are finding difficulty in filling the demands made upon them. Reductions were made also in monohydrated copper sulfate, 52-54% copper carbonate, and the black and red oxides. The present unfavorable statistical position of the metal is a definitely bearish influence.

The statistical position of tin is likewise responsible for further reductions in all of the tin salts. A slight strengthening took place late in the month, but it is very difficult to say if any permanent improvement can be looked for in the immediate future. Efforts are, of course, being made to lend artificial strength to the tin market by the cartel through further restriction on production, but control is becoming more difficult. Antimony had a bad drop last month too, with the result that antimony needle and the oxide were lowered. Lead acetate declined 1c to a 10c basis.

Other price changes included a 20c decline in commercial and iron-free aluminum sulfate, a 5c reduction in potassium cyanide to a 50c level, a $3 a ton drop in natural barium carbonate, and a $5 a ton loss in manganese dioxide. Two price revisions were made in the salt market, a rise in rock salt of 40c per ton, caused by higher freight rates, and a reduction in the common vacuum grade of 20c per ton. A ½c a pound decline was noted in potassium perchlorate.

The seasonal demand for certain of the warm-weather chemicals was adversely affected by the generally cool temperatures, but this situation is considered as being temporary. A fair demand for alkalies was noted, the bichromates likewise moved out in fair quantities, but naturally the tonnage was well below normal in view of the poor paint demand and the restricted activity in the tanning and textile fields. A slightly better demand for cyanides tended to offset the competitive situation somewhat.

Elon H. Hooker

Elon Huntington Hooker, 68, founder and president, Hooker Electrochemical, died of pneumonia May 11 in Pasadena, Calif.

Born in Rochester, N. Y., Mr. Hooker received his A. B. degree from the University of Rochester in 1891 and his A. M. degree in 1894. Later he studied engineering at Cornell, receiving his C.E. degree in 1894 and a Ph.D. in 1896. After post-graduate work on Cornell fellowships in France and Switzerland, Mr. Hooker was engaged in the construction of the Boston water supply system in the survey of Panama and Nicaragua Canal routes, and in the construction of a dam, water supply and research laboratory for Cornell University.

Recognizing the potentialities of the Niagara Falls power development, Mr. Hooker founded Hooker Electrochemical, with the company gradually moving to the position of being one of the largest producers of caustic soda, chlorine and chlorine products in the world. In 1925 he was one of the foremost bidders for Muscle Shoals in the water-power development of the Tennessee Valley.

He was a direct descendant of Thomas Hooker, founder, at Hartford, of the Colony of Connecticut in 1638. (See also rotogravure section, p. 675, this issue.)

New Antimony Refiner

The American Smelting & Refining Co. will start refining antimony at Perth Amboy, N. J., thus being the second American company to refine this metal. The first in the field was the Texas Smelting & Refining Co. at Laredo, Tex., which refines Mexican ore, as will the American Smelting & Refining Co.

Medley G. B. Whelpley, president of Anglo-Chilean Nitrate, has been elected a trustee of the N. Y. Trust Co.

Important Price Changes

	May 31	Apr. 30
ADVANCED		
Salt, rock, N. Y.	$13.20	$12.80
DECLINED		
Aluminum sulfate, com.	$1.15	$1.35
Iron free	1.35	1.55
Antimony, metal	.12	.13¾
Needle	.12½	.14
Oxide	.12	.12½
Barium carbonate, nat.	41.00	44.00
Copper carbonate 52-54	.1340	.145
Oxide, red	.15	.16
Black	.13½	.14½
Sulfate, mono.	8.30	8.40
Sulfate	4.00	4.25
Lead acetate	.10	.11
Manganese dioxide	57.50	62.50
Potassium cyanide	.50	.55
Potassium perchlorate	.09	.09½
Salt, vacuum, N. Y.	16.30	16.50
Sodium antimoniate	.12⅜	.12¾
Sodium silicofluoride, imp.	.04¾	.05
Sodium stannate	.25½	.26
Tin crystals	.31	.31½
Metal	.3570	.36¼
Oxide	.44	.46
Tetrachloride	.18½	.19

Windecker Succumbs Suddenly

Clifton Nichols Windecker, 68, retired Diamond Alkali vice-president, died suddenly on June 1 of a heart attack. His unexpected death came as a shock, not only to members of his family, but to the entire community in which he lived and to his wide host of friends and acquaintences in the chemical field. Mr. Windecker was in charge of manufacturing for Diamond for years, had helped in the selection of the site for the huge Diamond plant at Painesville, Ohio, and had greatly contributed to the company's sensational growth. He retired from active service in June, 1936. Mr. Windecker was formerly president of the Thunder Bay Quarries Co. of Alpena, Mich.; vice-president of the Standard Portland Cement Co.; president of the Lake County Gas Co.; and a director of the First National Bank in Painesville.

Since 1936, when Mr. Windecker severed his connection with Diamond Alkali, he had been engaged in industrial research.

Mathieu Expands in N. E.

A. H. Mathieu and Son, Inc., Paterson, N. J., has taken over property at 140 Tremont st., Everett, Mass., and will open a direct branch for serving New England territory. Company is a large factor in acetic acid, heavy chemicals, and plans several new specialties for the textile trade.

Opens Phila. Office

Columbia Alkali is opening a Philadelphia office at 3034 N. 16 st., in charge of Chris F. Bingham, formerly a member of the Columbia technical service department.

Fine Chemicals

Mercury Rises Sharply

Stocks Cut Sharply Following Speculative Buying on West Coast—Mercurials Advanced—All Tartars Quoted Higher—Citric Acid Reduced 1c—Competition Forces Further Decline in Vanillin—Camphor Weak—Glycerine Stocks Show Increase—Swann Starts Commercial Production of Synthetic Menthol—

The market for fine chemicals, pharmaceuticals, etc., was featured last month by a series of very important price revisions despite the fact that the general trend of activity is still well below normal. The old saying of "The worm finally turns" was aptly illustrated by the sudden flare-up in quicksilver. After months of steady decline the price was advanced $12 a flask. Heavy buying by banks for unknown principals on the Pacific Coast was reported on in the May issue. Little is known concerning the sudden interest in this commodity, but the trade generally believes that the purchases were of a speculative-hedge nature. It now appears that stocks both in the East and on the Coast were depleted to such an extent that a sharp rise was inevitable. Naturally all of the mercurials were advanced.

The underlying strength for the past several months in the tartars became more self-evident when increases were made in tartaric acid, cream of tartar, seidlitz mixture, Rochelle Salt and tartar emetic.

More unexpected was the 1c decline in citric acid made on May 25. The new schedule is now 23c for carlots, 23½c for 10,000 lb. lots, and 24c for small quantities. These quotations are the lowest ever to prevail for this item. Increasing competition between domestic sources of supply is said to be the cause of the most recent reduction, and it comes at a time when the item usually becomes seasonally more active. With the acid down ½c reductions were made in both sodium and potassium citrates.

Increasing competition was also at the bottom of two sharp declines in vanillin and a 25c drop in coumarin. Camphor was weaker in the past month in the face of little demand and the same thing is true of natural menthol. Stocks of both of these items in the hands of consumers are still large and as a result there is little active trading at the moment.

Agar prices were lowered in the past month, but even with this last reduction there has been little stimulation given to the item. Aloin was marked up to $2.25, based on further strength in the raw material. Sulfanilamide made a right about face on the question of price after several months of declining prices. Extreme weakness again characterized the market for cocoa butter. Lycopodium was lower.

The glycerine market continues to lag. While no price revisions were reported the March 31 statistics, showing increases in stocks of refined, crude and dynamite grades, helped to add to the uncertainty over future trends. Alcohol prices have held firm, but the volume is decidedly off from that which prevailed at this time a year ago. Bismuth holds steady in price but competition between the manufacturers of bismuth salts has prevented any upward revision in prices which would bring them more nearly in line with the last advance in the metal.

Trading in essential oils and the aromatic chemicals was in very narrow limits in the past 30 days. Buyers are generally only taking care of their restricted, immediate needs. Prices aside from vanillin and coumarin were fairly steady.

Mercury in '37

Output of mercury in the U. S. in '37 was approximately the same as in '36, being 16,508 flasks compared with 16,569 flasks, according to the Bureau of Mines. This apparently steady output failed to show the violent fluctuations in rates of operation at individual mines during the year for active mines were producing at capacity, and new mines were preparing for production early in '37 when demand and prices were high. Most of the mines, on the other hand, were closed late in the year when demand was very low and prices had dropped; producing mines were operating at only a small fraction of their capacities as the year closed.

The threatened world shortage of mercury failed to develop and leading industrial nations were able to obtain more than enough to supply their needs. With the recession in industrial activity in the latter part of 1937, particularly in the U. S., demand fell below normal.

The U. S. imported 18,900 flasks in '37 compared with 18,100 flasks in '36, but more than 18,000 flasks were imported in the 6-month period from October '36 through March '37. Receipts of metal from foreign countries were virtually nil in November and December. The United Kingdom imported 49,900 flasks during '37 of which 28,100 flasks were re-exported, Germany received 25,900 and France nearly 6,100 flasks. Italy made an important contribution towards filling world needs for quicksilver with a record output of nearly 67,000 flasks in '37.

The average monthly quoted price for mercury at N. Y. City was $90.25 a flask in January, rose to $96.65 in June and then moved continuously downward until it reached $81.04 in December. The N. Y. price was more than the tariff rate of $19.00 a flask above the London price until November and December.

Important Price Changes

ADVANCED	May 31	Apr. 30
Acid, tartaric	$0.26¼	$0.25¼
Aloin	2.25	2.00
Calomel	1.28	1.18
Corrosive sublimate	1.13	1.05
Cream of tartar	.21¾	.20¾
Mercury	82.00	71.00
Rochelle salt, cryst.	.17¾	.17
Powd,	.16¾	.16
Saffron, Spanish	32.00	28.00
Seidlitz mixture	.13⅞	.13⅜
Sulfanilamide	1.50	1.00
Tartar emetic, tech.	.27¾	.26¾
U. S. P.	.33	.32
Red precipitate	1.51	1.42
White precipitate	1.46	1.38
DECLINED		
Acid, ascorbic	$3.00	$3.35
Acid, citric	.23	.24
Anhydrous	.25½	.26½
Agar, No. 1	.80	.85
No. 2	.75	.80
Camphor	.53½	.54
Coumarin	2.50	2.75
Lycopodium	1.00	1.05
Menthol, natural	2.90	3.00
Potassium citrate	.33½	.34
Sodium citrate XI	.26½	.27
Vanillin, ex-eugenol	2.35	2.75
Ex-guaiacol	2.25	2.65

Swann Honored

Theodore Swann, president of Swann & Company, Birmingham, Ala., received the honorary degree of doctor of science from the University of Alabama last month. This was the third honorary degree awarded the Birmingham industrialist and former head of the Swann Corp. by Southern schools within recent years.

Mr. Swann's new company is now actively producing and marketing synthetic menthol, benzoic acid, and a long line of organic chemicals used in the perfume, flavoring and other fields. Swann chemists have developed a number of entirely new products with interesting possibilities.

Merck's New Bottle

Merck & Co., Rahway, N. J., will begin distribution June 15 of all acids and ammonia in its "Pour-clean" bottle. Company has developed a one-piece plastic screw closure, sturdy to the point of being practically indestructible, and with a number of other desirable characteristics.

Coal-Tar Solvents Reduced Sharply

Competition From Petroleum Solvents and Restricted Consumption in Coatings Field Forces Declines in Solvent Naphtha, Toluol and Xylol—Imported Cresylic Weakens Further—Coke Output Again Declines—Fair Demand for Benzol—

Coal-tar Chemicals

The outstanding news of the coal-tar chemical markets last month was, of course, the sharp reductions made on toluol, xylol, and solvent naphtha. Such a move on the part of suppliers was not entirely unexpected and was forced by the restricted consumption of solvents by lacquer manufacturers and by the increasing competition from petroleum solvents.

Benzol, on the other hand, was in fair demand. Because of the sharp decline in coking operations the supplies of benzol have been drastically cut. In certain sections of the country producers were experiencing some difficulty in making prompt shipments. The current price on existing contracts will remain unchanged over the balance of the year.

The drop in toluol amounted to 8c a gal., bringing the new price level down to 27c in drums and 22c in tanks. Nitration grade was lowered 4c a gal., and the new schedule is 31c in drums and 26c in tanks. Xylol was lowered 4c a gal. Industrial grade is now being quoted at 31c in drums and 26c in tanks. Prices for solvent naphtha were revised as follows: High flash was reduced 4c a gal., to a basis of 31c in drums and 26c for tanks. The water-white was off 5c, to a basis of 31c in drums and 26c in tanks.

In the face of little interest from consuming industries, save the disinfectant field, the market for cresylic acid was marked by rather severe competitive conditions. Imported pale 97-99% was reduced 5c, to a basis of 75c. Domestic quotations were unchanged during the period.

With plentiful supplies of imported crude naphthalene available, it is small wonder that further weakness in the price structure developed. Producers of domestic crude, however, held pretty firmly to previously established price levels. Movement of refined naphthalene was reported fair, although the cool weather in most parts of the country has had a detrimental effect. However, this is regarded as a temporary condition, and with the advent of the first few hot June days a decided pick-up is expected. The price structure on refined remains fairly stable.

No improvement can be reported in the consumption of creosote. The larger consumers, railroads and public utilities are still marking time. A seasonal betterment was reported in road oils. Phenol continues very dull, largely because the synthetic resin field has failed so far to register any substantial gains. A fair export business lends stability to the market, however.

No expansion has yet occurred in the call for intermediates and coal-tar acids. This is readily understandable when the existing conditions in the textile field are reviewed. A somewhat more optimistic viewpoint is noticeable, however, over the possibility of improvement in the late summer. Stocks of most of the coal-tar chemicals are not large and any decided improvement in demand would lend firmness to the price structure.

Marking the 8th month of continuous decline, the total output of coke in April, at 2,510,964 tons, dropped 9% below the level of March production and was 46% less than that of April, '37. Production of byproduct coke amounted to 2,436,264 tons, a decrease of nearly 9% from the March total. Production in April of '37 totaled 4,348,826 tons. Output for the first 4 months amounted to 10,367,395 tons, as compared with 17,192,502 tons in the same period of last year. Benzol output in April was reported at 5,385,000 gals., as compared with 5,998,000 gals. in March, a decrease of 10%. April, '37 output amounted to 10,328,000 gals. For the first 4 months production reached 23,113,000 gals., as against 40,956,000 gals. in the corresponding months of last year. Light oil recovery in April amounted to 10,058,481 gals., as against 11,043,461 gals. in the preceding month and 18,116,990 gals. in April of '37. Production for the first 4 months amounted to 42,815,726 gals., as compared with 71,630,145 gals. in the like period of a year ago. April tar production totaled 30,624,793 gals., as compared with 33,623,725 gals. in the preceding month and 55,348,546 in the corresponding month of '37. The production figures for the first 4 months were 130,359,908 gals. and 218,842,443 gals., respectively.

Buys Carpenter-Morton

The Bay State Chemical Co. announces that it has bought the entire leather finish division of the Carpenter-Morton Co. Besides the machinery and equipment, materials, colors and chemicals this includes all formulae from which to make the identical leather finishes which were made by them.

The Bay State Chemical Company will now supply the leather finish customers of the former company and all future orders will be under the supervision of Mr. Roberts of the former company.

N. E. Council to Meet

Williams Haynes, publisher of Chemical Industries, will speak before the New England Council on June 25. Meeting will be held at Woodstock, Vt. Dr. Gustavus Esselen, of Boston, will also address the meeting.

Important Price Changes

	May 31	Apr. 30
ADVANCED		
None.		
DECLINED		
Naphthalene, crude, imp.	$1.75	$1.90
Solvent naphtha:		
Drs., high flash	.31	.36
Tks.	.26	.31
Water-white, drs.	.31	.36
Tks.	.26	.31
Toluol, pure, drs.	.27	.35
Tks.	.22	.30
Nitration, drs.	.31	.39
Tks.	.26	.35
Xylol, industrial, drs.	.31	.35
Tks.	.26	.30
Nitration, tks.	.33	.37

News of the Dye Companies

General Aniline Works is starting a $20,000 addition to the Rensselaer, N. Y., plant.

Calco Happenings

Construction of a dam by Calco Chemical at its Bound Brook plant to spread the discharge of industrial wastes into the Raritan River had the approval on May 11 of the N. J. State Board of Health.

Project is the initial step in the company's compliance with a board order directing it to end pollution of the river. Plans approved by the board called for disposal of treated wastes over a larger dilution area.

Calco held open house on May 14 in connection with the celebration of the 250th anniversary of Somerset County, N. J.

Kalko Formed

Another independent labor organization, formed as a collective bargaining agency under the Wagner Act, made its debut at the Calco Chemical plant.

Organizers of the Kalko Independent Employes Association, Inc., it is said, are not affiliated with the A. F. of L. or the CIO or any other national vertical union, but instead is composed of men working in the Calco plants.

New association is not affiliated with the Calcocraft, but is a separate and distinct entity. Kalko has requested the National Labor Relations Board to place its name on the ballot in the event any election is to take place for a bargaining agency at Calco.

At the same time officials of the company have been requested to consider the new organization as a bargaining agency. This right is also demanded by the A. F. of L. due to the recent ruling of the board.

Requests of the new union create a new problem at the Calco plants, because the Calcocraft was ruled out as a "Company Union."

Solvents and Plasticizers

Solvents in Light Demand

Automotive, Rubber Industries Restrict Operations Further—No. 8 Aromatic Solvent Reduced 1c—Denaturing Grade Methanol Again Declines—Methyl Acetone Off 1½c—April Methanol Production Figures Show Decline—Plastic Field Still Dull—

The market for solvents continues to reflect the very unsatisfactory rate of operations in the various consuming industries, particularly in paint, lacquer and varnish, and in rubber. The drastic price reduction in solvent naphtha, toluol, and xylol is reported on in detail in the Coal-tar Chemicals page. The single price reduction in the petroleum solvent field in answer to the slash by the coal-tar solvent makers was a 1c decline in the No. 8 aromatic solvent. A little weakness developed in the N. Y. metropolitan area on tankwagon quotations for certain of the petroleum solvents, but the price situation on tanks in both the East and Mid-Continent districts was firm. There has been no price change in the lighter fractions (butanes, hexanes, octanes) for some months.

The demand for acetone, butyl alcohol, cellulose acetate and ethyl acetate was quite spotty in the past month but there was no change in the price structure. The outlook for any immediate improvement in consumption of solvents and plasticizers is not very bright.

Production of automotive units in May, according to preliminary estimates, did not reach the 200,000 mark. Further curtailment in the Detroit area is expected over the summer period. There is little hope there now that a turn for the better will take place until manufacturers begin operations on next season's models, and even then manufacturing is very likely to be of a cautious nature.

The situation in the rubber field presents no more pleasant outlook. Crude rubber consumption in April amounted to only 27,984 tons, a decrease of 8.2% from the March consumption of 30,487 tons, and a decline of 46% from the corresponding month of last year. Shipments of pneumatic casings in April amounted to 3,199,363 units, compared with 2,877,660 in March and 5,560,453 in April of last year. Production was 2,705,606 casings in April, against 2,705,606 in March and 5,729,869 in April of last year. Stocks at the end of April totaled 10,316,774, compared with 12,628,872 on April 30, '37. The situation in the Akron area was aggravated in the past month by a strike at one of the largest plants, but happily this one was settled in a short period of time.

The two principal price changes in the solvents group aside from those previously mentioned was a 3c decline in denaturing grade of methanol and a 1½c drop in methyl acetone. Both of these items have been subject to considerable shading and the newly established published quotations may tend to lend greater stability.

Synthetic methanol production in April showed a decline from the previous month and from the corresponding month of '37. The same was true of crude. April synthetic output was 1,975,999 gals., as against 2,343,828 in March and 2,138,895 in April of '37. Production for the first 4 months totaled 7,895,759 gals., as compared with 9,507,330 in the same period of last year. April crude output was 314,664 gals., as against 432,800 in March and 531,727 in April of '37. For the first 4 months of '38 the volume reached 1,614,741 gals., comparing unfavorably with 2,104,144 in the same months of the previous year.

April production of ethyl alcohol totaled 12,739,423 proof gals., as compared with 16,824,151 in April of '37. Production of completely denatured was 297,743 wine gals., as against 255,623 in the same month of last year. April removal was 300,348 gals., as against 261,524; stocks at the end of the month were 546,054 gals., as compared with 792,893 on April 30, '37. Production of specially denatured totaled 5,989,710 gals., as compared with 6,843,259 in April a year ago; removal amounted to 6,063,471 gals., as against 6,454,712, while stocks totaled 581,235 gals., as compared with 864,449 gals. on April 30, '37.

Plastic Field Still Dull

Production of nitrocellulose sheets, rods and tubes for the first quarter of the current year totaled only 1,358,382 lbs., as compared with 4,262,955 lbs. for the corresponding period of '37. Output of cellulose acetate sheets, rods and tubes for the first quarter amounted to but 850,550 lbs., comparing unfavorably with 3,744,254 lbs. in the first 3 months of '37. In the pyroxylin-coated textile field light goods shipments in March amounted to 2,827,462 linear yds., as compared with 2,575,661 in February and with 4,769,506 in March of '37. March heavy goods shipments were reported at 1,913,336 linear yds., as compared with 1,511,615 in February and with 2,642,703 in March of last year. Shipments of pyroxylin spread amounted to 4,943,100 lbs., as against 4,258,768 in February and 7,803,471 lbs. in March of the previous year.

Atlantic Refining to Build

An expansion and development program requiring capital expenditures of $28,000,000, to be undertaken by the Atlantic Refining Co. during 1938, was announced recently by J. W. Van Dyke, chairman of the board. This compares with capital expenditures of approximately $3,982,000 last year.

Important Price Changes

ADVANCED	May 31	Apr. 30
None.		
DECLINED		
Methanol, denat., grd.:		
Tks.	$0.25	$0.28
Drs.	.31	.34
Methyl acetone, nat.:		
Drs.	.30	.31½
Tks.	.25	.26½

Dr. John M. Kessler

Dr. John Martin Kessler, 55, president, Kessler Chemical, Philadelphia, Pa., was found dead in the Orange Hotel, Orange, N. J., May 17.

Born in Germany, Dr. Kessler was educated at Heidelberg and Munich University, receiving his Ph.D. degree in 1906. He was affiliated with E. deHaen from 1906 to 1908, and for the next two years was associated with the Continental Pegamoid Co. Dr. Kessler came to this country in 1910 to enter the employ of du Pont, remaining with that company until 1920 when he founded Kessler Chemical. He remained as president of the company until 1929, when the firm became a wholly owned subsidiary of American Commercial Alcohol under the name of the Kessler Chemical Corp. Dr. Kessler continued as its head until his death.

Kroneman in Petrolatums

William F. Kroneman, 1016 76th st., Brooklyn, has been appointed director of sales on petrolatums and white mineral oils by The Pennsylvania Oil Products Refining Co., Butler, Pa. Mr. Kroneman will maintain his offices at the Brooklyn address and the telephone number is Shore Road 5-6687.

Salesmen's Golf Dates

The golf dates of the Salesmen's Association of the American Chemical Industry have been announced as follows: June 14, Baltusrol Golf Club, Short Hills, N. J.; July 12, Garden City Country Club, Garden City, L. I.; August 16, Green Meadow Golf Club, Harrison, N. Y.; and the grand finale of the season—Sept. 13 at the well-known Shackamaxon Country Club, Westfield, N. J. Every member holding a '38 dues card, and who enters the Baltusrol tournament, gets a "free ride" at Green Meadows in August.

Research Executives Form Group

Industrial research executives have formed an institute under the auspices of the National Research Council. Robert P. Colgate, vice-president, Colgate-Palmolive-Peet, Jersey City, N. J., is chairman of the executive committee.

MOISTURE-CONTROL

. . the constant factor in conditioning problems

In various industries, conditioning processes share the common problem of moisture-control.

Moisture-control is an extremely important problem—because it affects so many qualities in the finished product. Freshness, taste, softness, fragrance—these and other qualities, dependent on proper retention of moisture, can make or break a product's sales.

Atlas Sorban does not present an infallible answer to this troublesome problem. But—we can truly say that in many cases, Sorban has achieved results beyond the scope of any other known agent. Sorban's narrow humectant range (its tendency *not* to absorb or to release much moisture) recommends it to the attention of all chemists interested in moisture-control or other phases of conditioning.

In the application of Sorban to your conditioning problems, the Atlas staff will be glad to work with you either in your own laboratories or in our new chemical plant at Atlas Point—the only plant in the country devoted to the electrolytic reduction of organic chemicals.

CHEMICALS ATLAS EXPLOSIVES

INDUSTRIAL CHEMICALS DEPARTMENT

ATLAS

POWDER COMPANY

Wilmington, Delaware

ATLAS SORBAN

(the trade name of Atlas Commercial Grade Sorbitol Solution)

It is a humectant agent of superior stabilizing action, represents an outstanding technical contribution to the field of conditioning agents. It is unique in combining in one product four qualities essential for a general purpose conditioning agent:

1. *Narrow Humectant Range.*
2. *Non-Volatility.*
3. *High Viscosity.*
4. *Chemical Stability.*

Potash Prices Renewed for Next Season

Active Mixing Season Wanes—Organic Ammoniates Decline—Fertilizer Consumption Expected to be 12-13% Under Last Year—April Superphosphate Production Drops Sharply—Some Resale Sulfate Offered—N. F. A. Gathers at White Sulphur—

Agricultural Chemicals

With the active mixing season just about over the market for raw fertilizer materials declined in activity in the past month. Trading was largely limited to small quantities required by mixers for special purposes. Buyers are not anxious to carry over much stock of raw materials in view of the decided uncertainty that prevails in agricultural and business circles.

The most important news of the month was the issuance of imported potash prices for the next season. Quotations and discounts are unchanged, but the shipping periods during which the discounts are available have been shortened. The domestic sources of supply followed the lead of the importers.

No indications have been given as to the price structure for the next season on the nitrogen group. In certain circles the opinion was expressed that the release of prices on sulfate, nitrate, cyanamid and other nitrogenous materials would be delayed beyond the usual time, largely because conditions are so uncertain. Another reason advanced is that the international nitrogen cartel is scheduled to meet in June.

Price movements in the past month were all on the downward side. Most of the organic ammoniates again lost ground in the face of extremely light demand. It appears that price reductions are no longer much bait, for mixers are generally well-stocked for the limited business expected over the balance of the present season. Momentarily, at least, there is practically no interest in futures on the part of buyers and this has caused sellers in many instances to withdraw offers. The entire industry feels that some time is required to clarify the present situation.

The demand for sulfate at the moment is very light and some reselling at $1 or 50c below the established price was reported, although the tonnage involved is not thought to be very large. The output of sulfate in the past few months has practically been cut in half and any sudden unexpected increase in demand would undoubtedly stiffen the price structure at once. Whether such a demand will come at the end of the season is a question that is difficult to answer. Movement of nitrate was largely restricted to deliveries against existing contracts. Tonnage for this season is running behind last by quite a margin. Some tonnage of fish scrap moved in the Baltimore area when suppliers revised their price views. There was little life in the various phosphates.

Fertilizer sales have been showing a progressively greater drop this year as compared with '37. Total sales in 17 states in January were up 7%; sales in February were off 9%; were off 15% in March; and declined 21% in April. Aggregate sales in these 4 months were 13% below the corresponding period of last year.

April sales in 12 Southern states totaled 1,039,765 tons, a decline of 22% from April of '37, but were somewhat larger than sales in April of '36. South Carolina and Mississippi made the best relative showings, with sales 10% lower than last year. In the first 4 months of the year total sales were 3,921,672 tons, a 13% decline from '37, but 13% greater than in '36. As a result of larger tonnages in Illinois and Kansas, April sales in the Midwest were only slightly less than a year earlier.

Total fertilizer consumption in the year ended June '37 totaled 8,100,000 tons. Consumption in the current year is likely to be about 12-13% less, a total of about 6,900,000 tons. Decline in cotton acreage alone has likely accounted for about 400,000 tons of the decline in the South. While disappointing in some sections of the country, taking the country as a whole, this year's business should be fairly satisfactory. It is not far out of line with the average of the past 13 years.

April Superphosphate Output Off 27%

For the 4th consecutive month superphosphate production was well under the corresponding month of last year. The seasonal decline from March was somewhat less than usual. April output was, however, 23% larger than in April of '36. The decline in the Southern area was substantial. In the first 10 months of the current fiscal year, from July through April, production was 2% smaller than in the corresponding period of last year. Production in the North, however, still shows an increase over the '36-'37 period. Total stocks at the close of April were 23% greater than a year earlier, but were smaller than at the end of March. Complete statistical information on superphosphate, etc., is given each month in the Statistical and Technical Data Section (Blue Section), published as Part 2.

Sulfate Output Cut Half

April sulfate production totaled 34,344 tons, as against 36,578 tons in March and 69,820 in April of last year. For the first 4 months of '38 output totaled 142,138 tons as against 274,971 in the same period of last year.

Important Price Changes

ADVANCED	May 31	Apr. 30
None.		
DECLINED		
Blood, dried, N. Y.	$2.50	$2.70
Chgo.	2.35	2.80
Imported	2.90	3.00
Bone meal, Chgo.	16.00	17.00
Castor pomace	19.00	20.00
Fish scrap, dried, ungrd.	2.75	3.00
Hoofmeal, Chgo.	2.50	3.00
Nitrogenous mat., imp.	2.35	2.40
Western	2.10	2.25
Tankage, N. Y., ungrd.	2.35	2.60
Fert. grade, Chgo.	2.25	2.45

Discuss Sales Decline

Over 500 fertilizer manufacturers assembled at White Sulphur Springs, W. Va., on June 6, to attend the 14th annual convention of The National Fertilizer Association.

"The convention is being held after a year in which fertilizer consumption has apparently decreased about 12% from the all-time high of 1936-37," said Charles J. Brand, executive secretary and treasurer of the Association. Mr. Brand stated that the decrease, which brings tonnage sales down to about the 1935-36 level, is largely a reflection of lowered farm purchasing power.

"It should be noted, however," Mr. Brand continued, "that while consumption has decreased in the South where fertilizer is used mostly on cotton, consumption has held up quite well in some of the Northeastern States. This has been due to greater realization by farmers of the necessity of applying fertilizer to pastures and meadows in order to use those areas most efficiently." Mr. Brand credited the activities of the Soil Conservation Service and the U. S. Department of Agriculture, as well as the educational efforts of the fertilizer industry, as being responsible in part for this broader use of plant food.

C. W. Miller Loses

Terminating litigation that had been pending for 5 years, Judge D. Lindley Sloan, in the Maryland Court of Appeals, May 17, decided adversely against C. Wilbur Miller, former president of Davison Chemical, Baltimore, in his action for $5,000,000 damages for alleged conspiracy to oust him as controlling executive of the company and of the Silica Gel Corp., a subsidiary.

Buys Atlanta Building

I. A. C. has purchased the building in Atlanta, Ga., formerly occupied by General Motors Acceptance Corp., located at 494 Spring st., N. W. Several departments will be consolidated in new building.

"LOOK FOR A TOUGH WEDGE FOR A TOUGH LOG"

Publius Syrus gave us this maxim in 42 B. C., but it holds equally true today. A modern version might well be—"Order Starkie Pitch when you need a tough binder."

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STARKIE BINDER A Pure Synthetic Pitch • ASPHALT • GILSONITE • VEGETABLE OILS • VEGETABLE AND ANIMAL FATTY ACIDS • NAPHTHENIC ACIDS • STEARIC ACID • ASBESTOS FIBRES • CAROB FLOUR • BENTONITE • DIATOMACEOUS EARTH

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Paint Oils Suffer Further Price Relapse

Restricted Demand Causes Price Weakness in Chinawood, Linseed, Perilla, etc.—Refined Fish Oils Go Lower—Stocks of Drying Oils at Record Levels—April Cottonseed Consumption Slightly Below Expectations—Fats and Oils Buying Limited Largely to Replacement Lots—

The whole tone of the oils and fats markets in the past 30 days was one of distinct bearishness and practically all of the important members of the group sank to fresh new lows for the current recession. The weakness in Chinawood was further accentuated by several declines and at the close drums were quoted at 10¼c and tanks at 9½c. The whole line of paint oils showed net losses during the month, particularly babassu, perilla, the refined fish oils, and, of course, linseed and oiticica.

In the vegetable oil classification coconut lost ground when copra prices weakened, and peanut and soybean both worked into new lows. The animal oils and fats lacked demand and stearin and tallow showed sizable price recessions. A fair demand at times was reported for many of the edible oils but soapers were only reported as showing but minor interest, and the peak in the demand for paint oils appeared to be definitely over. Stocks of oils and fats in the hands of actual consumers are said to be at a pretty low point, but importers are still holding sizable quantities. There appears to be a general suspicion that prices have just about hit the low point, but as yet buyers are not inclined to enter into commitments for large quantities because of the pale of uncertainty that hangs over the business horizon.

Then, too, the recent report of the Bureau of Agricultural Economics, issued last month, shows that the sharply curtailed consumption of drying oils has caused stocks of linseed, Chinawood, and perilla to reach record heights. Estimated consumption in the first quarter of the current year is just about two-thirds of that registered in the first 3 months of '37. (For further statistics on the oils and fats situation see the Statistical and Technical Data Section, Blue Section, Part 2, of this issue).

The outstanding bearish tone in the oils and fats markets is aptly shown by the almost complete lack of speculative interest in cottonseed oil. Refined cotton oil is now at the lowest point it has been since last October.

One result of the generally weakened price structure in the oils and fats was the decline in the amount of oil offered by resellers. First hands have shown a decided tendency to match any concessions offered by consumers who wish to unload. Even those who hold to the theory that prices are scraping the bottom on many items admit that the immediate outlook is not promising.

Despite the recent developments in the Sino-Japanese struggle there is little effort on the part of consumers to build up large inventories of tung oil. Readily available supplies are at hand to care for the present restricted needs until late fall.

April cottonseed oil consumption amounted to 231,975 bbls., slightly below the average guess of the trade on the N. Y. Produce Exchange which anticipated a total in the neighborhood of 256,000 bbls.

The April disappearance figure, however, compares favorably with that of Apr., '37, when 207,405 bbls. were consumed, although it is a little lower than the 10-year average for April of 242,611 bbls.

Dreyer, Fischbeck Merge

The essential oil firms of P. R. Dreyer, Inc., and Charles Fischbeck Co., Inc., both of N. Y. City, have consolidated and will continue under the name of P. R. Dreyer, Inc. The Dreyer firm is now located at 119 W. 19th st.

M, M & R in New Quarters

Magnus, Mabee & Reynard, well-known N. Y. City essential oil and aromatic chemical house, moved into its new building last month, located at 16 Desbrosses st. Building is 6 stories, facaded with glass brick front and back.

Killeen in Europe

E. V. Killeen, president, George Lueders & Co., essential oils and aromatics, N. Y. City, sailed May 21 in the *Nieuw Amsterdam*, which on that date began its maiden voyage from New York to Holland.

Review New England Research

Dr. William J. Hale, Dow research consultant, Dr. Harrison E. Howe, editor of *Industrial & Engineering Chemistry*, and Prof. Clifford C. Furnas, Yale University, were among the speakers on Connecticut Research Day—the dinner was held May 20 at the Hotel Bond, Hartford. Similar meetings were held in the other New England states. D. H. Killeffer, consultant, N. Y. City, was on the program at the meeting held in Boston; Prof. Wilbur E. Bradt, University of Maine, spoke before the Maine group.

MCA Supports Patent Bill

The Manufacturing Chemists Association on May 11 filed with the house committee on patents a brief in support of H.R. 7851, a bill to exclude the importation of articles made abroad in violation of U. S. process patents.

Fats and Oils

Important Price Changes

	May 31	Apr. 30
ADVANCED		
None.		
DECLINED		
Babassu	$0.06¼	$0.06½
Chinawood, drs	.10¼	.12½
Tks.	.09½	.116
Coconut, edible	.09	.09¼
Manilla, tks., N. Y.	.03¼	.03⅜
Tks., Pac. Coast	.03	.03⅛
Linseed, raw, tks.	.084	.087
Boiled, tks.	.088	.091
Menhaden, ref'd alk., drs.	.083	.087
Tks.	.077	.081
Kettle-bodied, drs.	.092	.097
Light-pressed, drs.	.077	.081
Tks.	.07	.074
Oiticica, bbls.	.09¼	.10½
Olive oil, denat. bbls.	.88	.90
Foots, bbls.	.07⅞	.08¼
Peanut, crude, tks.	.06⅞	.07
Refined, bbls.	.09¾	.10
Perilla, drs.	.10	.10½
Tks.	.10	.10½
Sardine, crude	.36	.38
Refined alk., tks.	.077	.089
Light pressed, drs.	.077	.081
Tks.	.07	.074
Soybean, crude, tks.	.06	.06½
Refined, tks.	.072	.077
Stearin, oleo, bbls.	.05½	.06
Tallow, ext. loose	.04¾	.05⅛
Edible	.06	.06¼

Deaths of the Month

Frank G. Stantial, vice president, Merrimac Chemical, Everett, Mass., and a lifelong resident of Melrose, died on Apr. 30, at his home, in his 81st year. He had been ill for three years.

He was educated in the Melrose schools and graduated from M. I. T. in 1879, as a chemical engineer. He had been associated with Merrimac Chemical in all of his business life.

Linwood C. Powers, 43, general advertising manager of Virginia-Carolina Chemical, died May 6 while on a business trip to Danville, Va.

Henry Popp, 77, president, Fort Orange Chemical, Albany, N. Y., died on May 2 after an illness of only a few weeks.

Edward R. H. Gruenewald, 58, president, Alaska Chemical, North Bergen, N. J., died at his Palm Beach home after a brief illness.

Clarence Philander Linville, 59, Calco research executive, died May 25 from pneumonia, following an operation.

William B. Keeling, president, Humiston, Keeling & Co., Chicago wholesale drug house, died May 24.

Gavin J. Tyndall, 58, vice-president, George L. Claflin Co., Providence wholesale drug house, died May 25.

Harrison F. Wilmot, 51, president, Wilmot & Cassidy, Brooklyn chemical manufacturer, died on May 23. He was at one time technical adviser to the S.O.C.M.A., and was prominent a number of years ago in the affairs of the Salesmen's Association of the American Chemical Industry.

Natural Raw Materials

Spotty Demand for Raw Materials Continues

Corn Derivatives Slightly Higher—Sumac Lowered in Price—Domestic Egg Albumen Up 2c—Beeswax Unsettled—Carnauba Prices Stiffen—Important Varnish Gums Decline Further—Shellac Markets Quiet—Little Interest in Naval Stores and Prices Sag—

Important Price Changes

ADVANCED	May 31	Apr. 30
Albumen, egg, ed.	$0.82	$0.80
Corn sugar, tanners	3.20	3.15
Corn syrup, 42°	3.14	3.09
43°	3.19	3.14
Dextrin, corn	3.55	3.50
British Gum	3.80	3.75
White	3.50	3.45
Egg yolk	.62	.60
Starch, pearl	2.65	2.60
Powd.	2.75	2.70
DECLINED		
Albumen, egg, imp.	$0.82	$0.85
Myrobalans, J2	20.50	21.00
Sumac, grd., Sicilian	63.50	64.00
Leaf	65.00	67.00
Valonia beards	47.00	49.00
Cups	33.00	35.00
Zinc dust	.06	.0615

TVA Hearings Start

The Congressional Committee appointed to investigate T. V. A. held its first hearing May 25, when former chairman Dr. Arthur E. Morgan appeared to make his statement in support of the charges he had made against the other two directors, Dr. Harcourt A. Morgan and David Lilienthal. In a prepared statement, Dr. Morgan stated that he made no charge of taking bribes or of financial dishonesty against the other two directors. He did charge them with having made misleading statements to the President, to the Congress, and to the public. He stated that the policy of the Authority as to power and as to the manufacture of fertilizer had never been divulged to the TVA Board of Directors or to the public. He claimed that no allocation of costs had ever been made to power, flood control, and navigation; therefore no power costs had ever been determined.

On May 26, Dr. Harcourt A. Morgan, present chairman, denied generally all the charges made by Dr. Arthur E. Morgan. Specifically, he stated that the agricultural and fertilizer policy was included in the contracts entered into by the Authority with the Land-Grant Colleges, experiment stations, and extension services, and with the U. S. Dept. of Agriculture, all of which contracts had been signed by Dr. Arthur E. Morgan as chairman of the Authority. He stated that about 25,000 tons of concentrated superphosphate had been furnished the Agricultural Adjustment Administration to be distributed as grants in aid under the soil conservation program. Later, David Lilienthal emphatically denied the charges made by Dr. Arthur E. Morgan. He claimed that latter had read only portions of letters and documents in making his charges, whereas if the entire language had been read an entirely different meaning would have been revealed.

There was definitely no improvement in the volume of forward buying in the natural raw materials last month, but a slight pick-up was reported in spot purchasing, indicating that inventory stocks in the hands of consumers are finally reaching an extremely low point. The general decline in most of the wholesale commodity markets has helped to defer any sizable commitments.

Price movement during the period under review was mixed, a number of declines just about equaling the number of advances. Corn derivatives turned slightly firmer and 5c increases were made in dextrin, starch, corn syrup, and tanners' corn sugar.

Other price changes included a 2c advance in domestic edible egg albumen, a 3c drop in the imported item bringing both to 82c, a slight decline in J2 Myrobalans, a $2 decline in valonia beards and a similar loss for the cups, a 50c decline in ground Sicilian sumac, and a $2 reduction in the leaf.

Demand for the tanning extracts was fair, a better tone being in evidence in the final week of the month. Natural dyestuffs were spotty, but the price structure was well maintained.

The wax markets passed through another month of dullness with purchasing restricted in the majority of cases to small replacement lots. Prices were somewhat unsettled for several of the grades of beeswax; some shading was reported on Candelilla; Japan was slightly lower with demand extremely light.

The weakness in Carnauba that has prevailed for several months was not quite so much in evidence last month although buying was not particularly heavy. Near the close of the month prices actually stiffened when cables from Brazil reported that the crop was well under normal.

Little change in the basic conditions took place in the market for shellac. There is little tendency on the part of buyers to load up at present price levels, although they are at the lowest point for some time. Published quotations were unchanged. The markets in London and Calcutta were soft.

Trading in the natural varnish resins registered no improvement. In fact, actual buying declined rather sharply in the last half of the month due to seasonal influences.

Naval stores were dull last month. Prices generally sank to fresh lows. With the general wholesale commodity markets in the doldrums there is little if any bullish news that would add strength to rosin and turpentine. The statistical picture was worse with stocks in the primary ports generally larger at the close of the month than at the beginning. Weather conditions in the South have on the whole been favorable to production. A noticeable lack of foreign inquiries was an added bearish factor.

Revise Naval Stores Act

Revised regulations under the Naval Stores Act have been promulgated by the Food and Drug Administration of the Dept. of Agriculture, and copies will be made available to the trade shortly.

Expands N. Y. Offices

International Selling Corp., manufacturers agents and importers, has enlarged its office facilities at 26 Beaver st. by taking the entire 10th floor, which is in addition to offices maintained on the 15th floor in the same building.

New Tungsten Plant

The Cleveland Tungsten Manufacturing Co., Cleveland, is opening a new plant at 10,200 Meech ave. Company produces tungstic acid, tungsten powder, and the metal in a wide variety of forms and shapes.

Starkie's New Representation

A. E. Starkie Co., 1645 S. Kilbourn ave., Chicago, now represents the Utah Gilsonite Co. in Chicago area. Spot stocks will be maintained by the Starkie organization.

Ross in Hoboken

Frank B. Ross Co., importer of waxes and related products, has moved from N. Y. City to 507 8th st., Hoboken, N. J. Phone is Hoboken 3-4100.

Walmsley in Detroit

Monsanto's Cleveland manager, H. P. Walmsley, is now in charge of Detroit territory with offices at 2312 Union Guardian Bldg., Detroit.

Study Solar Energy

Sun power by conversion of solar energy into forms useful for the tasks of man will be sought in a far-reaching program of chemical, mechanical and electrical research to be started soon at M. I. T. This undertaking is made possible by a gift of $647,700 from Dr. Godfrey L. Cabot, of Boston, who has long been interested in finding means of utilizing the inexhaustible energy of the sun as a source of useful power.

Pigments and Fillers

Paint Production Peak Passes

Spring Season Generally Disappointing—Red Lead, Litharge and Orange Mineral Lower When Metal Suffers Price Relapse Late in May—Casein Turns Firmer—Construction in April Off 18%—Lacquer Sales in First Quarter Reflect Poor Demand in Coatings, Metal Finishing Fields—

Activity in the raw paint materials markets in the first two weeks of May reached a peak for the spring season, but definite signs that the crest of the wave was passed appeared on the horizon in the final half of the month. Paint producers are still hopeful that the stimulus of Federal Government aid to building will be sufficient this summer to provide a good market for their products. Little hope is held for any improvement in lacquer sales for industrial purposes until fall when production of the '39 automobile models gets under way.

The lead market suffered two ¼c declines late in May. As a result the price structure of red lead, litharge, and orange mineral was lowered a ½c in each case, but no change was made in white lead. The downward revision was the first since February 10 and, of course, was forced by the unfavorable statistical picture in the metal which grows progressively worse.

For the first time in months the casein market showed signs of firmness. Most of the suppliers raised quotations to 7½c for 20-30 mesh and 8c for 80-100 mesh. The increase was largely brought about when the suppliers began to withhold material from the market because the existing price levels were highly unprofitable. Outstanding in the advances last month were increases made in vermilion and technical red and yellow oxides. The market for mercury suddenly soared after months of steady declines and an advance in mercury products was inevitable with the metal up $12 a flask. The quotations on many of the grades of varnish gums were downward continuing the trend of the past months. Replacement prices show little signs as yet of strengthening, and on this basis local sources of supply find little reason for stiffening the price structure.

Paint Sales are Disappointing

While March paint sales of $30,728,890 (Bureau of the Census figures) were seasonally higher than the $22,625,906 reported for February, they compare most unfavorably with $39,498,071 for March of last year. March trade sales amounted to $17,227,950, as compared with $12,535,636 for February and $19,398,445 for March of '37. March industrial sales were reported at $10,417,161, as against $7,942,419 for February and $16,601,194 for March of last year. Industrial sales of paints and varnish amounted to $7,285,635 in March, while sales in the preceding month were $5,455,659, and $12,036,210 in March of '37. Industrial lacquer sales for March totaled $3,131,526, as against $2,486,760 in February and $4,564,984 in March of '37.

Total paint sales (including varnishes and lacquers of course) amounted to $75,469,991 for the first quarter of '38, comparing unfavorably with $101,802,389 for the same period of '37.

Lacquer Statistics for 1st Quarter

Lacquer sales for the first 3 months of the current year totaled 7,934,838 gals., as compared with 11,404,989 in the corresponding period of '37 and 9,559,648 in the first quarter of '36. These figures are supplied by the Bureau of the Census and cover the output of 158 manufacturers. The severe decline, of course, reflects the present status of the automotive field, the largest single consumer. Production of automobiles for the first 4 months of the current year is reported at only 838,191 units, as against 1,774,067 in the corresponding months of last year.

Seasonal Improvement in Calcimines

Sales of calcimines in March reached 6,968,497 lbs. as against 5,417,816 in February, but were under the March '37 total of 7,659,432 lbs. March sales of cold-water paints amounted to 4,434,573 lbs., as against 3,285,727 in the preceding month and 3,979,120 lbs. in March of last year, in this instance, a gain. March sales of plastic paints amounted to 560,499 lbs., as against 443,277 in February and 720,227 lbs. in March of '37.

Building Down 18%

Building and engineering contracts awarded in the 37 states east of the Rocky Mountains during April amounted to $222,016,000, according to F. W. Dodge Corp. While this total figure was 18% below the one for April, '37 (last year's peak month), it was only 2% under the total for March, '38. Six out of 15 districts included in this eastern territory showed increased total contracts over April of last year.

Mattiello Elected

Dr. Joseph Mattiello, Hilo Varnish technical director, was elected president of the N. Y. Paint and Varnish Production Club at the May meeting of that organization held May 19, at the Chemists' Club.

Important Price Changes

ADVANCED	May 31	Apr. 30
Casein, 20-30	$0.07½	$0.06½
80-100	.08	.07
Mercury oxide, tech. red	1.26	1.17
Yellow	1.21	1.12
Putty, com.	3.00	2.50
Linseed grade	4.50	4.00
Vermilion, English	1.55	1.45
DECLINED		
Lead, red, 95%	$0.06½	$0.07
97%	.06¾	.07½
98%	.07	.07½
Litharge	.05½	.06
Orange mineral	.09½	.10

Joins Titanium Pigment

Herman A. Pfeifer has joined the sales staff of Titanium Pigment Corp. as New England representative with headquarters in Boston. For the past two and one-half years, Mr. Pfeifer was associated with Bisbee Linseed as sales engineer in Philadelphia.

Schulte Elected

E. Schulte, Glidden Co., was elected president for the coming year at the meeting of the Cleveland Paint and Varnish Production Club May 20.

Stover Nominated

Albert H. Stover, Felton Sibley & Co., was nominated for the office of president of the Philadelphia Paint and Varnish Production Club at the May meeting. Other nominees were vice-president, J. C. Moore, Sinclair Refining; secretary, G. R. Henry, of du Pont, and treasurer, J. Richardson.

New Bulk Plant

Skelly Oil, 121 W. Wacker Drive, Chicago, opens a new solvents bulk plant. Dr. Ernest MacGee is in charge of solvents sales for Skelly Oil.

Outing Plans Announced

The New York Paint and Varnish Production Club's annual outing will be held Saturday, June 25, at Briarcliff Lodge, Briarcliff Manor, N. Y. Program committee, which is headed by Dr. Joseph Mattiello, of Hilo Varnish, has made arrangements for a varied sports program, including golf, tennis, softball, swimming, archery, handball, badminton and riding. Members of the club may invite guests at a charge of $5 for each guest. Carlton H. Rose, of National Lead, 105 York st., Brooklyn, is in charge of reservations.

Story of Petroleum

The history of petroleum is briefly traced in the June issue of *Priorities*, published by Prior Chemical Corp., 420 Lexington ave., N. Y. City. Copies are available.

Prices Current

Heavy Chemicals, Coal-tar Products, Dye-and-Tanstuffs, Colors and Pigments, Fillers and Sizes, Fertilizer and Insecticide Materials, Petroleum Solvents and Chemicals, Naval Stores, Fats and Oils, etc.

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f. o. b. works are specified as such. Import chemicals are so designated. Resale stocks when a market factor are quoted in addition to maker's prices and indicated "second hands."

Oils are quoted spot New York, ex-dock. Quotations f. o. b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f. o. b., or ex-dock. Materials sold f. o. b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both. Containers named are the original packages most commonly used.

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1937 Average $1.10 - Jan. 1938 $1.20 - May 1938 $1.24

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Acetaldehyde, drs, c-l, wks lb.	...	.14	...	.14	...	.14
Acetaldol, 95%, 50 gal drs wks lb.	.21	.25	.21	.25	.21	.25
Acetamide, tech, lcl, kegs lb.	.39	.43	.32	.43	.32	.43
Acetanalid, tech, 150 lb bbls lb.	...	.32	.29	.32	.24	.29
Acetic Anhydride, drs, f.o.b. wks, frt all'd lb.	.10½	.11	.10½	.11	.13	.15
Acetin, tech, drs lb.	...	.33	...	.33	.22	.33
Acetone, tks, f.o.b. wks, frt all'd lb.	...	.04¾	...	.04¾	.04¾	.06½
drs, c-l, f.o.b. wks, frt all'd lb.	...	.05¾	...	.05¾	.05¾	.07½
Acetyl chloride, 100 lb cbys lb.	.55	.68	.55	.68	.55	.68
ACIDS						
Abietic, kgs, bbls lb.	.09¾	.10	.09¾	.10	.06¾	.10
Acetic, 28%, 400 lb bbls, c-l, wks 100 lbs.	...	2.23	...	2.23	2.23	2.53
glacial, bbls, c-l, wks 100 lbs.	...	7.62	...	7.62	7.62	8.70
glacial, USP, bbls, c-l, wks 100 lbs.	...	10.25	...	10.25	10.50	12.43
Acetylsalicylic, USP, 225 lb bbls lb.	...	.60	...	.60	.50	.60
Adipic, kgs, bbls lb.	...	.72	...	.72	...	.72
Anthranilic, ref'd, bbls lb.	1.15	1.20	1.15	1.20	.85	1.00
tech, bbls lb.	...	.75	...	.75	...	.75
Battery, cbys, wks 100 lbs.	1.60	2.55	1.60	2.55	1.35	2.60
Benzoic, tech, 100 lb kgs lb.	.43	.47	.43	.47	.43	.47
USP, 100 lb kgs lb.	.54	.59	.54	.59	.54	.59
Boric, tech, gran, 80 tons, bgs, delv ton *a*	...	95.00	...	95.00	...	95.00
Broenner's, bbls lb.	...	1.11	...	1.11	...	1.11
Butyric, edible, c-l, wks, cbys lb.	1.20	1.30	1.20	1.30	1.20	1.30
synthetic, c-l, drs, wks lb.	...	.22	...	.22	...	.22
wks, lcl lb.	...	.23	...	.23	...	.23
tks, wks lb.	...	.21	...	.21	...	.21
Camphoric, drs lb.	5.50	5.70	5.50	5.70	5.50	5.70
Chicago, bbls lb.	...	2.10	...	2.10	...	2.10
Chlorosulfonic, 1500 lb drs, wks lb.	.03½	.05	.03½	.05	.03½	.05
Chromic, 99¾%, drs, delv lb.	.15¼	.17¼	.15¼	.17¼	.15¼	.16¾
Citric, USP, crys, 230 lb bbls lb. *b*	.23	.24	.23	.25	.24	.26
anhyd, gran, bbls lb. *b*	...	.25½	.25½	.26½	.26½	.29
Cleve's, 250 lb bbls lb.	.50	.52	.50	.52	.50	.52
Cresylic, 99%, straw, HB, drs, wks, frt equal gal.	.79	.81	.79	.91	.72	.91
99%, straw, LB, drs, wks, frt equal gal.	.87	.89	.87	.94	.77	.94
resin grade, drs, wks, frt equal lb.	.10¼	.10¾	.10¼	.11¼	.09	.11¼
Crotonic, bbls, delv lb.	.21	.50	.21	1.00	.75	1.00
Formic, tech, 140 lb drs lb.	.10½	.11½	.10½	.11½	.10½	.13
Fumaric, bbls lb.	...	.60	...	.60	...	.60
Fuming, see Sulfuric (Oleum)						
Gallic, tech, bbls lb.	.75	.79	.75	.79	.65	.75
USP, bbls lb.	.87	.91	.87	.91	.77	.91
Gamma, 225 lb bbls, wks lb.	...	.85	...	.85	...	.85
H, 225 lb bbls, wks lb.	.50	.55	.50	.55	.50	.55
Hydriodic, USP, 10% sol. cbys lb.	.50	.51	.50	.51	.50	.51
Hydrobromic, 34% conct 155 lb cbys, wks lb.	.42	.44	.42	.44	.40	.42
Hydrochloric, see muriatic						
Hydrocyanic, cyl, wks lb.	.80	1.30	.80	1.30	.80	1.30
Hydrofluoric, 30%, 400 lb bbls, wks lb.	.07	.07½	.07	.07½	.07	.07½
Hydrofluosilicic, 35%, 400 bbls, wks lb.	.10½	.15	.10½	.15	.10½	.15
Lactic, 22%, dark, 500 lb bbls lb.	.02½	.02¾	.02½	.02¾	.02½	.02¾
22%, light ref'd, bbls lb.	.03½	.03¾	.03½	.03¾	.03½	.03¾
44%, light, 500 lb bbls lb.	.05½	.05¾	.05½	.05¾	.05½	.05¾
44%, dark, 500 lb bbls lb.	.06½	.06¾	.06½	.06¾	.06½	.06¾
50%, water white, 500 lb bbls lb.	.10½	.11½	.10½	.11½	.10½	.11½
USP X, 85%, cbys lb.	.42	.45	.42	.45	.42	.50
Lauric, drs. lb.	.08½	.09	.08½	.09	...	...
Laurent's, 250 lb bbls lb.	.45	.46	.45	.46	.45	.46
Levulinic, 5 lb bot, wks lb.	...	2.00	...	2.00	...	...
Linoleic, bbls lb.	...	.20	...	.20	.16	.20
Maleic, powd, kgs lb.	.30	.40	.30	.40	.29	.40
Malic, powd, kgs lb.	.45	.60	.45	.60	.45	.60
Metanillic, 250 lb bbls lb.	.60	.65	.60	.65	.60	.65
Mixed, tks, wks N unit	.06½	.07¼	.06½	.07¼	.06½	.07¼
S unit	.008	.009	.008	.009	.008	.009

a Powdered boric acid $5 a ton higher in each case; USP $15 higher; *b* Powdered citric is ½c higher; kegs are in each case ½c higher than bbls.; *y* Price given is per gal.

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Monochloracetic, tech, bbls lb.	.16	.18	.16	.18	.16	.18
Monosulfonic, bbls lb.	1.50	1.60	1.50	1.60	1.50	1.60
Muriatic, 18°, 120 lb cbys, c-l, wks 100 lb.	...	1.50	...	1.50	1.35	1.50
tks, wks 100 lb.	...	1.00	...	1.00	...	1.00
20°, cbys, c-l, wks 100 lb.	...	1.75	...	1.75	1.45	1.75
tks, wks 100 lb.	...	1.10	...	1.10	...	1.10
22°, c-l, cbys, wks 100 lb.	...	2.25	...	2.25	1.95	2.25
tks, wks 100 lb.	...	1.60	...	1.60	...	1.60
CP, cbys lb.	.06½	.07⅛	.06½	.07⅛	.06½	.07⅛
N & W, 250 lb bbls lb.	.85	.87	.85	.87	.85	.87
Naphthenic, 240-280 s.v., drs lb.	.10	.13	.10	.13	.10	.14
Sludges, drs lb.	...	.05	...	.05	.05	.10
Naphthionic, tech, 250 lb bbls lb.	.60	.65	.60	.65	.60	.65
Nitric, 36°, 135 lb cbys, c-l, wks 100 lb. *c*	...	5.00	...	5.00	...	5.00
38°, c-l, cbys, wks 100 lb. *c*	...	5.50	...	5.50	...	5.50
40°, cbys, c-l, wks 100 lb. *c*	...	6.00	...	6.00	...	6.00
42°, c-l, cbys, wks 100 lb. *c*	...	6.50	...	6.50	...	6.50
CP, cbys, delv lb.	.11½	.12½	.11½	.12½	.11½	.12½
Oxalic, 300 lb bbls, wks, or N Y lb.	.10¾	.12	.10¾	.12	.10¾	.12
Phosphoric, 85%, USP, cbys lb.	.12	.14	.12	.14	.12	.14
50%, acid, c-l, drs, wks lb.	.06	.08	.06	.08	.06	.08
75%, acid, c-l, drs, wks lb.	.09	.10½	.09	.10½	.09	.10½
Picramic, 300 lb bbls, wks lb.	.65	.70	.65	.70	.65	.70
Picric, kgs, wks lb.	.35	.40	.35	.40	.35	.40
Propionic, 98% wks, drs lb.	...	.22	...	.22	.20	.22
80% lb.	.16	.17½	.16	.17½	.16	.17½
Pyrogallic, tech, lump, pwd, bbls lb.	...	1.05	...	1.05	...	...
cryst, USP lb.	1.45	1.63	1.45	1.63	1.30	1.48
Ricinoleic, bbls lb.	...	.35	.35	.38	.35	.38
tech, bbls lb.	...	.13	...	.13	...	...
Salicylic, tech, 125 lb bbls, wks lb.	...	.33	...	.33	...	.33
USP, bbls lb.	.40	.45	.40	.45	...	...
Sebacic, tech, drs, wks lb.	.37	.41	.37	.41	.37	.41
Succinic, bbls lb.	...	.75	...	.75	...	.75
Sulfanilic, 250 lb bbls, wks lb.	.17	.18	.17	.18	.17	.18
Sulfuric, 60°, tks, wks ton	...	13.00	...	13.00	12.00	13.00
c-l, cbys, wks 100 lb.	...	1.25	...	1.25	1.10	1.25
66°, tks, wks ton	...	16.50	...	16.50	15.50	16.50
c-l, cbys, wks 100 lb.	...	1.50	...	1.50	1.35	1.50
CP, cbys, wks lb.	.06½	.07½	.06½	.07½	.06½	.07½
Fuming (Oleum) 20% tks, wks ton	...	18.50	...	18.50	...	18.50
Tannic, tech, 300 lb bbls lb.	.40	.47	.40	.47	.19	.47
Tartaric, USP, gran, powd, 300 lb bbls lb.	.26¼	.26¾	.24¼	.26¾	.21¾	.25¼
Tobias, 250 lb bbls lb.	.65	.67	.65	.67	.65	.67
Trichloroacetic bottles lb.	2.00	2.50	2.00	2.50	2.00	2.50
kgs lb.	...	1.75	...	1.75	...	1.75
Tungstic, tech, bbls lb.	no price		...	...	...	...
Vanadic, drs, wks lb.	1.10	1.20	1.10	1.20	1.10	1.20
Albumen, light flake, 225 lb bbls lb.	.52	.60	.52	.60	.47	.60
dark, bbls lb.	.13	.18	.11	.18	.11	.17
egg, edible lb.	.82	.84	.80	1.15	.76	1.15
vegetable, edible lb.	.74	.78	.74	.78	.76	.78
Alcohol, Amyl (from Pentane) tks, delv lb.	...	.123	...	.123	...	.123
c-l, drs, delv lb.	...	.133	...	.133	...	.133
lcl, drs, delv lb.	...	.143	...	.143	...	.143
Amyl, secondary, tks, delv lb.	...	.08½	...	.08½	...	.08½
drs, c-l, delv E. of Rockies lb.	...	.09½	...	.09½	...	...
Benzyl, cans lb.	.68	1.00	.68	1.00	.65	1.10
Butyl, normal, tks, f.o.b. wks, frt all'd lb. *d*	...	.09	...	.09	.08½	.09
c-l, drs, f.o.b. wks, frt all'd lb. *d*	...	.10	...	.10	.09½	.10
Butyl, secondary, tks, delv lb. *d*	...	.06	...	.06	.06	.07
c-l, drs, delv lb. *d*	...	.07	...	.07	.07	.08
Capryl, drs, tech, wks lb.	...	.85	...	.85	...	.85
Cinnamic, bottles lb.	2.00	2.50	2.00	2.50	2.00	3.65
Denatured, CD, No. 11, 12, 13, c-l, drs, wks gal. *e*	...	.33	.33	.35	.33	.35
tks, East, wks gal.	...	.27	.27	.29	...	...
Western schedule, c-l, drs, wks gal. *e*	...	.26	.26	.28	.37	.39
Denatured, SD, No. 1, tks	...	.25	.25	.27	.26	.27
c-l, drs, wks gal. *e*	...	.31	.31	.33	.32	.33

c Yellow grades 25c per 100 lbs. less in each case; *d* Spot prices are 1c higher; *e* Anhydrous is 5c higher in each case; *f* Pure prices are 1c higher in each case.

ABBREVIATIONS—Anhydrous, anhyd; bags, bgs; barrels, bbls; carboys, cbys; carlots, c-l; less-than-carlots, lcl; drums, drs; kegs, kgs; powdered, powd; refined, ref'd; tanks, tks; works, f.o.b., wks.

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Alcohols (continued):						
Diacetone, pure, c-l, drs, delv ....lb. *f*	...	.11½	...	.11½	...	.11½
tech, contract, drs, c-l, delv ....lb.	...	.10½	...	.10½	...	...
Ethyl, 190 proof, molasses,						
tks ....gal. *g*	...	4.04	4.04	4.06	4.05	4.07
c-l. drs ....gal. *g*	...	4.10	4.10	4.12	4.11	4.12
c-l, bbls ....gal. *g*	...	4.11	4.11	4.13	4.12	4.13
absolute, drs ....gal. *g*	4.40	4.45	4.40	4.47	4.54	6.08½
Furfuryl, tech, 500 lb drs lb.	.30	.35	.30	.35	.30	.35
Hexyl, secondary tks, delv lb.	...	.12	...	.12	.11½	.12
c-l, drs, delv ....lb.	...	.13	...	.13	.12½	.13
Normal, drs, wks ....lb.	3.25	3.50	3.25	3.50	3.25	3.50
Isoamyl, prim, cans, wks lb.	...	.32	...	.32	...	.32
drs, lcl, delv ....lb.	...	.27	...	.27	...	.27
Isobutyl, ref'd, lcl, drs ..lb.	...	.10	...	.10	...	.10
c-l, drs ....lb.	...	.09½	...	.09½	...	.09½
tks ....lb.	...	.08½	...	.08½	...	.08½
Isopropyl, ref'd, 91%, c-l, drs, f.o.b. wks, frt all'd ....lb.	...	.36	...	.36	.39½	.45
Ref'd 98%, drs. f.o.b. wks, frt all'd ....**gal.**	...	.41	...	.41	...	...
Tech 91%, drs, above terms ....gal.	...	.33½	...	.33½	...	...
tks, same terms ...gal.	...	.28½	...	.28½	...	...
Tech 98%, drs, above terms ....gal.	...	.37½	...	.37½	...	...
tks, above terms ..gal.	...	.32½	...	.32½	...	...
Spec Solvent, tks, wks gal.	...	.26	.26	.28	.27	.28
Aldehyde ammonia, 100 gal drs ....lb.	.80	.82	.80	.82	.80	.82
Aldehyde Bisulfite, bbls, delv ....lb.	...	.17	...	.17	...	...
Aldol, 95%, 55 and 110 gal drs, delv ....lb.	...	.20	...	.20	...	...
Alphanaphthol, crude, 300 lb bbls ....lb.	...	.52	...	.52	...	.52
Alphanaphthylamine, 350 lb bbls ....lb.	.32	.34	.32	.34	.32	.34
Alum, ammonia, lump, c-l, bbls, wks ....100 lb.	3.40	3.65	3.40	3.65	3.00	3.25
delv NY, Phila ...100 lb.	...	3.40	...	3.40	3.15	3.40
Granular, c-l, bbls. wks ....100 lb.	3.15	3.40	3.15	3.40	2.75	3.00
Powd, c-l, bbls, wks 100 lb.	...	3.55	...	3.55	3.15	3.40
Chrome, bbls ....100 lb.	6.50	6.75	6.50	6.75	6.50	7.25
Potash, lump, c-l, bbls, wks ....100 lb.	3.65	3.90	3.65	3.90	3.25	3.50
Granular, c-l, bbls, wks ....100 lb.	3.40	3.65	3.40	3.65	3.00	3.25
Powd, c-l, bbls, wks 100 lb.	3.80	4.05	3.80	4.05	3.40	3.65
Soda, bbls, wks ....100 lb.	...	3.25	...	3.25	...	3.25
Aluminum metal, c-l, NY 100 lb.	...	20.00	...	20.00	19.00	20.00
Acetate, 20%, bbls ....**lb.**	.07½	.09	.07½	.10	.09	.10
Basic powd, bbls, **delv lb.**	.40	.50	.40	.50	...	...
Chloride anhyd, 99%, wks lb.	.07	.12	.07	.12	.07	.12
93%, wks ....lb.	.05	.08	.05	.08	.05	.08
Crystals, c-l, drs, wks lb.	.06	.06¼	.06	.06¼	.06	.06¼
Solution, drs, wks ....lb.	.02¾	.03¼	.02¾	.03¼	.02¾	.03¼
Formate, 30% sol bbls, c-l, delv ....**lb.**	...	.13	...	.13	...	...
Hydrate, 96%, light, 90 lb bbls, delv ....lb.	.12	.13	.12	.13	.13	.15
heavy, bbls, wks ....lb.	.029	.03½	.029	.03½	.029	.03½
Oleate, drs ....lb.	.16¾	.18½	.16¾	.18½	.16¾	.18½
Palmitate, bbls ....lb.	...	.23	...	.23	.22	.23
Resinate, pp., bbls ....lb.	...	.15	...	.15	...	.15
Stearate, 100 lb bbls ....lb.	.19	.21	.19	.21	.19	.21
Sulfate, com, c-l, bgs, wks ....100 lb.	...	1.15	1.15	1.35	...	1.35
c-l, bbls, wks ....100 lb.	...	1.35	1.35	1.55	...	1.55
Sulfate, iron-free, c-l, bgs, wks ....100 lb.	...	2.00	...	2.00	...	1.90
c-l, bbls, wks ....100 lb.	...	2.20	...	2.20	...	2.05
Aminoazobenzene, 110 lb kgs lb.	...	1.15	...	1.15	...	1.15
Ammonia anhyd fert com, tks lb.	.04½	.05½	.04½	.05½	.04½	.05½
Ammonia anhyd, 100 lb cyl lb.	.16	.22	.16	.22	.16	.22
26°, 800 lb drs, delv ....lb.	.02¼	.02½	.02¼	.02½	.02¼	.02½
Aqua 26°, tks, NH ...cont.	...	.05	...	.05	.04½	.05
tk wagon ....lb.	...	.02	...	.02	...	.02
Ammonium Acetate, kgs ..lb.	.26	.33	.26	.33	.26	.33
Bicarbonate, bbls, f.o.b. wks ....100 lb.	5.15	5.71	5.15	5.71	5.15	5.71
Bifluoride, 300 lb bbls ..lb.	.16	.17	.16	.17	.16	.17
carbonate, tech, 500 lb bbls ....lb.	.08	.12	.08	.12	.08	.12
Chloride, White, 100 lb bbls, wks ....100 lb.	4.45	4.90	4.45	4.90	4.45	4.90
Gray, 250 lb bbls, wks ....100 lb.	5.50	6.25	5.50	6.25	5.00	6.25
Lump, 500 lbs cks spot lb.	.10½	.11	.10½	.11	.10½	.11
Lactate, 500 lb bbls ....lb.	.15	.16	.15	.16	.15	.16
Laurate, bbls ....lb.	...	.23	...	.23	...	...
Linoleate, 80% anhyd, bbls ....**lb.**	...	.15	...	.15	.11	.15
Naphthenate, bbls ....lb.	...	.17	...	.17	...	...
Nitrate, tech, cks ....lb.	.038	.0405	.038	.0405	.03¾	.04
Oleate, drs ....lb.	...	.15	...	.15	.15	.10
Oxalate, neut, cryst, powd, bbls ....lb.	.19	.20	.19	.22½	.22½	.23
Perchlorate, kgs ....lb.	...	.16	...	.16	...	.16
Persulfate, 112 lb kgs ..lb.	.21	.24	.21	.24	.21	.24
Phosphate, dibasic tech, powd, 325 lb bbls ....lb.	.07½	.10	.07½	.10	.07½	.10
Ricinoleate, bbls ....lb.	...	.15	...	.15	...	...
Stearate, anhyd, bbls ...lb.	...	.24	...	.24	...	...
Paste, bbls ....lb.	...	.07½	...	.07½	...	...

g Grain alcohol 20c a gal. higher in each case.

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Ammonium (continued).						
Sulfate, dom, f.o.b., bulk ton	...	28.50	...	28.50	26.00	28.00
200 lb bgs ....ton	...	29.80	...	29.80	...	29.30
100 lb bgs ....lb.	...	30.50	...	30.50	...	30.00
Sulfocyanide, pure, **kgs..lb.**	...	.55	...	.55	...	.55
Amyl Acetate (from pentane)						
tks, delv ....lb.	...	.11½	...	.11½	...	.11½
tech, drs, delv ....lb.	...	.12	...	.12	.11½	.13½
Secondary, tks, delv ..lb.	...	.08½	...	.08½	...	.08½
c-l, drs, delv ....lb.	...	.09½	...	.09½	...	.09½
tks, delv ....**lb.**	...	.08½	...	.08½	...	.08½
Chloride, norm, drs, **wks** lb.	.56	.68	.56	.68	.56	.68
mixed, drs, wks ....lb.	.07	.077	.07	.077	.07	.077
tks, wks ....lb.	...	.06	...	.06	...	.06
Mercaptan, drs, wks ....lb.	...	1.10	...	1.10	...	1.10
Oleate, lcl, wks, drs ....lb.	...	.25	...	.25	...	.25
Stearate, lcl, wks, drs ..lb.	...	.26	...	.26	...	.26
Amylene, drs, wks ....lb.	.102	.11	.102	.11	.102	.11
tks, wks ....lb.	...	.09	...	.09	...	.09
Aniline Oil, 960 lb drs and tks ....lb.	.14½	.17½	.14½	.17½	.15	.17½
Annatto fine ....lb.	.34	.37	.34	.37	.34	.37
Anthracene, 80% ....lb.	...	.75	...	.75	...	.75
40% ....**lb.**	...	.18	...	.18	...	.18
Anthraquinone, sublimed, 125 lb bbls ....lb.	...	.65	...	.65	.50	.65
Antimony metal slabs, ton lots ....lb.	.12	.13	.12	.14	.13⅝	.17¼
Butter of, see Chloride.						
Chloride, soln cbys ....lb.	...	.17	...	.17	...	.17
Needle, powd, bbls ....lb.	.12½	.14	.12½	.16	.14	.19½
Oxide, 500 lb bbls ....lb.	.12	.12½	.12	.16½	.14¼	.16½
Salt, 63% to 65%, tins ..lb.	.26	.27	.26	.27	.22	.24
Sulfuret, golden, bbls ...lb.	.22	.23	.22	.23	.22	.23
Archil, conc, 600 lb bbls ..lb.	.21	.27	.21	.27	.21	.27
Double, 600 lb bbls ....lb.	.18	.20	.18	.20	.18	.20
Aroclors, wks ....lb.	.18	.30	.18	.30	.18	.30
Arrowroot, bbl ....lb.	.08½	.09	.08½	.09	.08½	.09¾
Arsenic, Metal ....lb.	.42	.44	.42	.44	.42	.44
Red, 224 lb cs kgs ....lb.	...	.15¾	...	.15¾	...	.15¾
White, 112 lb kgs ....lb.	.03	.04	.03	.04	.03	.04
Barium Carbonate precip, 200 lb bgs, wks ....ton	52.50	62.50	52.50	62.50	52.50	62.50
Nat (witherite) 90% gr, c-l, wks, bgs ....ton	41.00	43.00	41.00	44.00	42.00	45.00
Chlorate, 112 lb kgs, NY lb.	.16½	.17½	.16½	.17½	.16½	.17½
Chloride, 600 lb bbls, delv, zone 1 ....ton	77.00	92.00	77.00	92.00	74.00	92.00
Dioxide, 88%, 690 lb drs lb.	.11	.12	.11	.12	.11	.12
Hydrate, 500 lb bbls ....lb.	.04¾	.05½	.04¾	.05½	.04¾	.05½
Nitrate, bbls ....**lb.**	.07	.08¼	.07	.08¼	.07	.08¼
Barytes, floated, 350 lb bbls c-l, wks ....**ton**	...	23.65	...	23.65	...	23.65
Bauxite, bulk, mines ....ton	7.00	10.00	7.00	10.00	7.00	10.00
Bentonite, c-l, 325 mesh, bgs, **wks ....ton**	...	16.00	...	16.00	...	16.00
200 mesh ....**ton**	...	11.00	...	11.00	...	11.00
Benzaldehyde, tech, 945 lb drs, wks ....lb.	.60	.62	.60	.62	.60	.62
Benzene (Benzol), 90%, Ind, 8000 gal tks, ft all'd ..gal.	...	.16	...	.16	...	.16
90% c-l, drs ....**gal.**	...	.21	...	.21	...	.21
Ind pure, tks, frt all'd gal.	...	.16	...	.16	...	.16
Benzidine Base, dry, 250 lb bbls ....lb.	.70	.72	.70	.72	.70	.72
Benzoyl Chloride, 500 lb drs lb.	.40	.45	.40	.45	.40	.45
Benzyl Chloride, 95-97% rfd, drs ....lb.	.30	.40	.30	.40	.30	.40
Tech, drs ....lb.	.25	.26	.25	.26	.25	.26
Beta-Naphthol, 250 lb bbl, wks ....lb.	.23	.24	.23	.24	.23	.24
Naphthylamine, sublimed, 200 lb bbls ....lb.	1.25	1.35	1.25	1.35	1.25	1.35
Tech, 200 lb bbls ....lb.	.51	.52	.51	.52	.51	.52
Bismuth metal ....lb.	1.05	1.15	1.00	1.10	1.00	1.10
Chloride, boxes ....lb.	3.20	3.25	3.20	3.25	3.20	3.25
Hydroxide, boxes ....**lb.**	3.15	3.20	3.15	3.20	3.15	3.20
Oxychloride, boxes ....lb.	...	2.95	...	2.95	2.75	3.04
Subbenzoate, boxes ....lb.	3.25	3.30	3.25	3.30	3.25	3.30
Subcarbonate, kgs ....lb.	1.13	1.16	1.13	1.58	1.23	1.58
Trioxide, powd, boxes ..lb.	...	3.57	...	3.57	3.45	3.57
Subnitrate, fibre, drs ...**lb.**	1.03	1.06	1.03	1.48	1.22	1.48
Blackstrap, cane (see Molasses, Blackstrap).						
Blanc Fixe, 400 lb bbls, wks ....ton *h*	40.00	75.00	40.00	75.00	40.00	75.00
Bleaching Powder, 800 lb drs, c-l, wks, contract ..100 lb.	...	2.00	...	2.00	...	2.00
lcl, drs, wks ....lb.	2.25	3.60	2.25	3.60	2.25	3.60
Blood, dried, f.o.b., NY ..unit	...	2.50	2.50	3.10	3.10	4.30
Chicago, high grade ...unit	...	2.35	2.35	3.35	3.00	4.65
Imported shipt ....**unit**	...	2.90	2.90	3.45	3.25	4.10
Blues, Bronze Chinese Milori Prussian Soluble ....lb.	.36	.37	.36	.37	.36	.37
Ultramarine,* dry, wks, bbls ....lb.	...	.11	...	.11	.10	.11
Regular grade, group 1 lb.	...	.16	...	.16	.15	.16
Special, group 1 ....lb.	...	.19	...	.19	.18	.19
Pulp, No. 1 ....lb.	...	.27	...	.27	.26	.27
Bone, 4½ + 50% raw, Chicago ....ton	26.00	29.00	26.00	30.00	26.00	30.00
Bone Ash, 100 lb **kgs** ....lb.	.06	.07	.06	.07	.06	.07
Black, 200 lb bbls ....lb.	.06½	.08¼	.06½	.08¼	.05½	.08¼
Meal, 3% & 50%, imp ..ton	...	21.00	21.00	23.75	23.75	27.50
Domestic, bgs, Chicago ton	16.00	18.00	16.00	22.00	19.00	27.00
Borax, tech, gran, 80 ton lots, sacks, delv ....ton *i*	...	42.00	...	42.00	40.00	42.00
bbls, delv ....ton *i*	...	52.00	...	52.00	50.00	52.00

h **Lowest price is for pulp, highest for high grade precipitated;** *i* **Crystals** $6 per ton higher; USP, $15 higher in each case; *** Freight is equalized in each case with nearest producing point.**

Borax
Chrome Yellow

Prices

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Borax (continued):						
Tech, powd, 80 ton lots, sacks ....ton j	...	47.00	...	47.00	45.00	47.00
bbls, delv ....ton j	...	57.00	...	57.00	56.00	57.00
Bordeaux Mixture, drs ...lb.	.11	.11½	.11	.11½	.10½	.11
Bromine, cases ....lb.	.30	.43	.30	.43	.30	.43
Bronze, Al, pwd, 300 lb drs lb.	.90½	.92½	.90½	.92½	.80	1.50
Gold, blk ....lb.	.45	.65	.45	.65	.40	.65
Butanes, com 16-32° group 3 tks ....lb.	.02¼	.03¾	.02¼	.03¾	.02¼	.03¾
Butyl, Acetate, norm drs, frt allowed ....lb.	.10	.10½	.10	.10½	.10	.10½
tks, frt allowed ....lb.	...	.09	...	.09	...	.09
Secondary, tks, frt allowed ....lb.	...	.07	...	.07	.07	.07½
drs, frt, allowed .....lb.	.08	.08½	.08	.08½	.08	.09
Aldehyde, 50 gal drs, wks ....lb.	.16½	.17½	.16½	.17½	.16½	.17½
Carbinol, norm drs, wks lb.	.60	.75	.60	.75	.60	.75
Crotonate, norm, 55 and 110 gal drs, delv ....lb.	...	.36	...	.36	...	...
Lactate ....**lb.**	.22½	.23½	.22½	.23½	.22½	.23½
Oleate, drs, **frt allowed** ..lb.	...	.25	...	.25	...	.25
Propionate, **drs** ....**lb.**	.18	.18½	.18	.18½	.18	.18½
tks, delv ....lb.	...	.17	...	.17	...	.17
Stearate, 50 gal drs ....**lb.**	...	.26	...	.26	.25	.26
Tartrate, drs ....lb.	.55	.60	.55	.60	.55	.60
Butyraldehyde, drs, lcl, wks lb.	...	.35½	...	.35½	...	.35½
Cadmium Metal ....lb.	...	1.20	1.20	1.60	1.05	1.60
Sulfide, orange, boxes ..lb.	1.50	1.60	1.50	1.60	.90	1.60
Calcium, Acetate, 150 lb bgs c-l, delv ....100 lb.	...	1.65	...	1.65	1.65	2.25
Arsenate, c-l, E. of Rockies, dealers, drs ....lb.	.06¾	.07¼	.06¾	.07¼	.06¼	.07¾
Carbide, drs ....lb.	.05	.06	.05	.06	.05	.06
Carbonate, tech, 100 lb bgs c-l ....lb.	...	1.00	...	1.00	...	1.00
Chloride, flake, 375 lb drs,						
burlap bgs, c-l, delv..ton	...	22.00	22.00	23.50	22.00	23.50
paper bgs, c-l, delv...ton	23.00	36.00	23.00	36.00	...	...
Solid, 650 lb drs, c-l, delv ....ton	...	20.00	20.00	21.50	20.00	21.50
Ferrocyanide, 350 lb bbls wks ....lb.	...	.17	...	.17	...	.17
Gluconate, Pharm, 125 lb bbls ....lb.	.50	.57	.50	.57	.50	.57
Levulinate, less than 25 bbl lots, wks ....**lb.**	...	3.00	...	3.00	...	...
Nitrate, 100 lb bgs .....**ton**	...	28.00	...	28.00	26.10	28.00
Palmitate, bbls ....lb.	.22	.23	.22	.23	.22	.23
Phosphate, tribasic, tech, 450 lb bbls ....lb.	.06½	.07½	.06½	.07½	.06½	.07½
Resinate, precip, bbls ...lb.	.13	.14	.13	.14	.13	.14
Stearate, 100 lb bbls ...lb.	.19	.21	.19	.21	.19	.21
Camphor, slabs ....**lb.**	.53½	.55	.53½	.56	.54	.56
Powder ....lb.	.53½	.55	.53½	.56	.54	.56
Camwood, Bk, ground bbls lb.	.16	.18	.16	.18	.16	.18
Carbon Bisulfide, 500 lb drs lb.	.05	.05¾	.05	.05¾	.05	.05¾
Black, c-l, bgs, delv, price varying with zone† ...lb.	.027	.0380	.027	.0380	.0320	.0535
lcl, bgs, f.o.b. whse ..lb.	...	.05¾	...	.05¾	.06½	.07
cartons, f.o.b. whse..lb.	...	.06¼	...	.06¼	.07	.07¾
cases, f.o.b. whse ...lb.	...	.07	...	.07	.07¾	.08¼
Decolorizing, drs, c-l ...**lb.**	.08	.15	.08	.15	.08	.15
Dioxide, Liq 20-25 lb cyl lb.	.06	.08	.06	.08	.06	.08
Tetrachloride, 55 or 110 gal drs, c-l, delv ....lb.	.05¼	.06	.05¼	.06	.05¼	.06
Casein, Standard, Dom, grd lb.	.07½	.08½	.06½	.13½	.11	.20¾
80-100 mesh, c-l, bgs ....lb.	.08	.09	.07	.14	.11½	.21¼
Castor Pomace, 5½ NH_3, c-l, **bgs, wks** ....ton	...	19.00	19.00	21.00	21.00	25.00
Imported, ship, bgs ....ton	...	21.00	...	21.00	nom.	17.00
Celluloid, Scraps, ivory cs lb.	.12	.15	.12	.15	.12	.15
Transparent, cs ....lb.	...	.20	...	.20	...	.20
Cellulose, Acetate, 50 lb kgs ....lb.	...	.40	...	.40	.40	.55
Chalk, dropped, 175 lb bbls lb.	.03	.03¾	.03	.03¾	.03	.03¾
Precip, heavy, 560 lb cks lb.	.03	.04	.03	.04	.03	.04
Light, 250 lb cks ....lb.	.03¼	.04	.03¼	.04	.03	.04
Charcoal, Hardwood, lump, blk, wks ....**bu.**	...	.15	...	.15	...	.15
Softwood, bgs, delv* ....ton	23.00	34.00	23.00	34.00	23.00	34.40
Willow, powd, 100 lb bbl. wks ....lb.	.06	.07	.06	.07	.06	.07
Chestnut, clarified, tks, wks lb.	...	.02125	...	.02125	.01625	.02125
25%, bbls, wks ....**lb.**	...	.0225	...	.0225	.02	.0225
Pwd, 60%, 100 lb bgs, wks ....lb.	...	.04⅞	...	.04⅞	...	.04⅞
China Clay, c-l, blk mines ton	...	7.00	...	7.00	6.50	7.00
Imported, lump, blk ....ton	22.00	25.00	22.00	25.00	22.00	25.00
Chlorine, cyls, lcl, wks, contract ....lb.	.07½	.08½	.07½	.08½	.07½	.08½
cyls, c-l, contract ...lb. j	...	.05½	...	.05½	...	.05½
Liq, tk, wks, contract 100 lb.	...	2.15	...	2.15	...	2.15
Multi, c-l, cyls, wks, cont ....lb.	2.30	2.55	2.30	2.55	2.30	2.55
Chloroacetophenone, tins, wks ....lb.	3.00	3.50	3.00	3.50	3.00	3.50
Chlorobenzene, Mono, 100 lb drs, lcl, wks ....lb.	.06	.07½	.06	.07½	.06	.07½
Chloroform, tech, 1000 lb drs ....lb.	.20	.21	.20	.21	.20	.21
USP, 25 lb tins ....**lb.**	.30	.31	.30	.31	.30	.31
Chloropicrin; comml cyls ..lb.	...	.80	...	.80	...	.80
Chrome, Green, CP ....lb.	.21	.25	.21	.25	.20	.25
Yellow ....lb.	.14½	.15½	.14½	.15½	.13	.16½

j A delivered price; * Depends upon point of delivery; † New bulk price, tank cars ¼c per lb. less than bags in each zone.

Current

Chromium Acetate
Dinitrobenzene

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Chromium, Acetate, 8% Chrome, bbls .....lb.	.05	.08	.05	.08	.05	.08
Fluoride, powd, 400 lb bbl ....lb.	.27	.28	.27	.28	.27	.28
Coal tar, bbls ....bbl.	7.50	8.00	7.50	8.00	6.75	9.00
Cobalt Acetate, bbls ......lb.	.66	.68	.66	.68	.58	.68
Carbonate tech, bbls ....lb.	...	1.63	...	1.63	1.42¾	1.63
Hydrate, bbls ....lb.	...	1.36	...	1.36	...	...
Linoleate, solid, bbls ...lb.	...	.33	...	.33	.31	.33
paste, 6%, drs ....lb.	...	.31	...	.31	...	.31
Oxide, black, bgs ....lb.	...	1.67	...	1.67	1.41	1.67
Resinate, fused, bbls ....lb.	...	.13½	...	.13½	.13	.13½
Precipitated, bbls ....lb.	...	.34	...	.34	.30½	.34
Cochineal, gray or bk bgs..lb.	.35	.38	.35	.38	.32	.38
Teneriffe silver, bgs ....lb.	.36	.39	.36	.39	.33	.39
Copper, metal, electrol 100 lb.	...	9.00	9.00	11.00	11.00	16.25
Acetate, normal, bbls, wks ....lb.	.21	.23	.21	.23	...	...
Carbonate, 400 lb bbls ..lb.	...	.10¼	.10¼	.10½	.10½	.12½
52-54% bbls ....lb.	.1340	.1440	.1340	.16¾	.15¾	.19
Chloride, 250 lb bbls ...lb.	.13	.14	.13	.17	.15	.18
Cyanide, 100 lb drs .....lb.	...	.34	.34	.38	.37	.38
Oleate, precip, bbls .....lb.	...	.20	...	.20	...	.20
Oxide, black, bbls, wks..lb.	.13½	.14	.13½	.17½	.17	.18
red 100 lb bbls ....lb.	...	.15	.15	.19775	.17	.19975
Resinate, precip, bbls ...lb.	.15	.16	.15	.16	.15	.19
Stearate, precip, bbls ...lb.	.23	.24	.23	.24	.23	.40
Sub-acetate verdigris, 400 lb bbls ....lb.	.18	.19	.18	.19	.18	.19
Sulfate, bbls, c-l, wks 100 lb.	...	4.00	4.00	4.25	4.25	4.50
Copperas, crys and sugar bulk c-l, wks .... ton	12.00	13.00	12.00	13.00	12.00	13.00
Corn Sugar, tanners, bbls 100 lb.	3.20	3.30	3.10	3.30	3.15	4.34
Corn Syrup, 42°, bbls..100 lb.	...	3.14	3.04	3.16	3.11	4.36
43°, bbls ....100 lb.	...	3.19	3.09	3.21	3.16	4.41
Cotton, Soluble, wet, 100 lb bbls ....lb.	.40	.42	.40	.42	.40	.42
Cream Tartar, powd & gran, 300 lb bbls ....lb.	.21¾	.22¼	.19¾	.22¼	.15	.20¼
Creosote, USP, 42 lb cbys lb.	.45	.47	.45	.47	.45	.47
Oil, Grade 1, tks ......gal.	.13½	.14	.13½	.14	.13	.14
Grade 2 ....gal.	.122	.132	.122	.132	.113	.132
Cresol, USP, drs ....lb.	.12	.12½	.12	.12½	.10	.13
Crotonaldehyde, 97%, 55 and 110 gal drs, delv .....lb.	...	.22	.22	.30	.26	.30
Cutch, Philippine, 100 lb bale lb.	.05¼	.06	.04	.06	.04	.04¾
Cyanamid, bgs, c-l, frt allowed Ammonia ....unit	...	1.15	...	1.15	1.10	1.15
Derris root 5% rotenone, bbls ....lb.	.39	.43	.39	.43	.39	.47
Dextrin, corn, 140 lb bgs f.o.b., Chicago ....100 lb.	3.55	3.75	3.45	3.75	3.50	5.00
British Gum, bgs ...100 lb.	3.80	4.00	3.70	4.00	3.75	5.25
Potato, Yellow, 220 lb bgs lb.	.07¼	.08¾	.07¼	.08¾	.07¾	.08¾
White, 220 lb bgs, lcl..lb.	.08	.09	.08	.09	.08	.09
Tapioca, 200 bgs, lcl ....lb.	...	.0715	.0715	.08	...	.08
White, 140 lb bgs ...100 lb.	3.50	3.70	3.50	3.70	4.00	4.58
Diamylamine, c-l, drs, wks lb.	.47	.75	.47	.75	.47	.75
Diamylene, drs, wks ......lb.	.095	.102	.095	.102	.095	.102
tks, wks ....lb.	...	.08½	...	.08½	...	.08½
Diamylether, wks, drs ....lb.	.085	.092	.085	.092	.085	.092
tks, wks ....lb.	...	.075	...	.075	...	.075
Oxalate, lcl, drs, wks ...lb.	...	.30	...	.30	...	.30
Diamylphthalate, drs, wks lb.	.20½	.21	.20½	.21	.19	.21½
Diamyl Sulfide, drs, wks ..lb.	...	1.10	...	1.10	...	1.10
Diatomaceous Earth, see Kieselguhr.						
Dibutoxy Ethyl Phthalate, drs, wks ....lb.	...	.35	...	.35	...	.35
Dibutylamine, lcl, drs, wks lb.	...	.55	...	.55	...	...
Dibutyl Ether, drs, wks, lcl lb.	...	.30	...	.30	...	.30
Dibutylphthalate, drs, wks, frt all'd ....lb.	...	.21	...	.21	.19½	.21
Dibutyltartrate, 50 gal drs lb.	.45	.54	.45	.54	.35	.50
Dichlorethylene, drs ......lb.	...	.25	...	.25	.25	.29
Dichloroethylether, 50 gal drs, wks ....lb.	.15	.16	.15	.16	.15	.16
tks, wks ....lb.	...	.14	...	.14	...	.14
Dichloromethane, drs, wks lb.	...	.23	...	.23	...	.23
Dichloropentanes, drs, wks lb.	no prices		...	...	...	...
tks, wks ....lb.	no prices		...	...	...	...
Diethanolamine, tks, wks ..lb.	...	.23	...	.23	.23	.25
Diethylamine, 400 lb drs ..lb.	2.75	3.00	2.75	3.00	2.75	3.00
Diethylaniline, 850 lb drs..lb.	.40	.52	.40	.50	.40	.50
Diethyl Carbinol, drs .....lb.	.60	.75	.60	.75	.60	.75
Diethylcarbonate, com drs..lb.	.31¾	.35	.31¾	.35	.31¾	.35
Diethylorthotoluidin, drs ..lb.	.64	.67	.64	.67	.64	.67
Diethylphthalate, 1000 lb drs lb.	.19	.19½	.19	.19½	.18	.19½
Diethylsulfate, tech, drs, wks, lcl ....lb.	.13	.14	.13	.14	.13	.20
Diethyleneglycol, drs .....lb.	.16	.17	.16	.17	.16	.23
Mono ethyl ethers, drs ..lb.	.15	.16	.15	.16	.15	.17
tks, wks ....lb.	...	.14	...	.14	.14	.15
Mono butyl ether, drs ..lb.	.23	.24	.23	.24	.23	.26
tks, wks ....lb.	...	.22	...	.22	...	...
Diethylene oxide, 50 gal drs, wks ....lb.	.20	.24	.20	.24	.20	.24
Diglycol Oleate, bbls .....lb.	...	.21	...	.21	.21	.24
Laurate, bbls ....lb.	...	.27½	...	.27½	...	...
Stearate, bbls ....lb.	...	.27½	...	.27½	...	...
Dimethylamine, 400 lb drs, pure 25 & 40% sol 100% basis ....lb.	...	1.00	...	1.00	...	.95
Dimethylaniline, 340 lb drs lb.	.26	.27	.26	.27	.26	.27
Dimethyl Ethyl Carbinol, drs lb.	.60	.75	.60	.75	.60	.75
Dimethyl phthalate, drs, wks, frt allowed ....lb.	...	.19	...	.19	.20½	.21
Dimethylsulfate, 100 lb drs lb.	.45	.50	.45	.50	.45	.50
Dinitrobenzene, 400 lb bbls lb. k	.16	.19	.16	.19	.16	.19

k Higher price is for purified material.

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Dinitrochlorobenzene, 400 lb bbls . . . lb.	.13½	.14	.13½	.14	.14	.17½
Dinitronaphthalene, 350 lb bbls . . . lb.	.35	.38	.35	.38	.35	.38
Dinitrophenol, 350 lb bbls . . lb.	.23	.24	.23	.24	.23	.24
Dinitrotoluene, 300 lb bbls lb.	. . .	.15½	. . .	.15½	.14½	.15½
Diphenyl, bbls . . . lb.	.15	.25	.15	.25	.15	.25
Diphenylamine . . . lb.	.31	.32	.31	.32	.31	.32
Diphenylguanidine, 100 lb drs . . . lb.	.35	.37	.35	.37	.35	.37
Dip Oil, see Tar Acid Oil.						
Divi Divi pods, bgs shipmt ton	. . .	nom.	. . .	nom.	34.00	nom.
Extract . . . lb.	.05	.05½	.05	.05½	.05	.05½
EGG YOLK						
Egg Yolk, dom., 200 lb cases lb.	.62	.64	.60	.68	.68	nom.
Imported . . . lb.	.62	.65	.62	.68	.53	.65
Epsom Salt, tech, 300 lb bbls c-l, NY . . . 100 lb.	1.90	2.10	1.90	2.10	1.80	2.10
USP, c-l, bbls . . . 100 lb.	. . .	2.10	. . .	2.10	2.00	2.10
Ether, USP anaesthesia 55 lb drs . . . lb.	.22	.23	.22	.23	.22	.23
(Conc) . . . lb.	.09	.10	.09	.10	.09	.10
Isopropyl 50 gal drs . . . lb.	.07	.08	.07	.08	.07	.08
tks, frt allowed . . . lb.	. . .	.06	. . .	.06	. . .	.06
Nitrous, conc, bottles . . . lb.	. . .	.68	. . .	.68	.68	.77
Synthetic, wks, drs . . . lb.	.08	.09	.08	.09	.08	.09
Ethyl Acetate, 85% Ester tks, frt all'd . . . lb.	. . .	.05½	. . .	.05½	.05½	.06½
drs, frt all'd . . . lb.	. . .	.06½	. . .	.06½	.06½	.07½
95%, tks, frt allowed . . lb.	. . .	.06¾	. . .	.06¾	. . .	.06¾
drs, frt all'd . . . lb.	. . .	.07¾	. . .	.07¾	. . .	.07¾
Acetoacetate, 110 gal drs lb.	. . .	.27½	. . .	.27½	. . .	.27½
Benzylaniline, 300 lb drs lb.	.86	.88	.86	.88	.86	.88
Bromide, tech, drs . . . lb.	.50	.55	.50	.55	.50	.55
Cellulose, drs, wks, frt all'd . . . lb.	.6440	.9440	.6440	1.00	. . .	. . .
Chloride, 200 lb drs . . . lb.	.22	.24	.22	.24	.22	.24
Chlorocarbonate, cbys . . . lb.	. . .	.30	. . .	.30	. . .	.30
Crotonate, drs . . . lb.	1.00	1.25	1.00	1.25	1.00	1.25
Formate, drs, frt all'd . . lb.	.27	.28	.27	.28	.27	.31
Lactate, drs, wks . . . lb.	. . .	.33	. . .	.33	. . .	.33
Oxalate, drs, wks . . . lb.	.30	.34	.30	.34	.30	.34
Oxybutyrate, 50 gal drs, wks . . . lb.	.30	.30½	.30	.30½	.30	.30½
Silicate, drs, wks . . . lb.	. . .	.77	. . .	.77	. . .	.77
Ethylene Dibromide, 60 lb drs . . . lb.	.65	.70	.65	.70	.65	.70
Chlorhydrin, 40%, 10 gal cbys chloro, cont . . . lb.	.75	.85	.75	.85	.75	.85
Anhydrous . . . lb.	. . .	.75	. . .	.75	. . .	.75
Dichloride, 50 gal drs, wks lb.	.0545	.0994	.0545	.0994	.0545	.0994
Glycol, 50 gal drs, wks . . lb.	.17	.21	.17	.21	.17	.21
tks, wks . . . lb.	. . .	.16	. . .	.16	. . .	.16
Mono Butyl Ether, drs, wks . . . lb.	.20	.21	.20	.21	.20	.21
tks, wks . . . lb.	. . .	.19	. . .	.19	. . .	.19
Mono Ethyl Ether, drs, wks . . . lb.	.16	.17	.16	.17	.16	.17
tks, wks . . . lb.	. . .	.15	. . .	.15	. . .	.15
Mono Ethyl Ether Acetate, drs, wks . . . lb.	. . .	.14	. . .	.14	. . .	.14
tks, wks . . . lb.	. . .	.13	. . .	.13	. . .	13
Mono, Methyl Ether, drs wks . . . lb.	.18	.22	.18	.22	.18	.22
tks, wks . . . lb.	. . .	.17	. . .	.17	. . .	.17
Oxide, cyl . . . lb.	.50	.55	.50	.55	.50	.55
Ethylidenaniline . . . lb.	.45	.47½	.45	.47½	.45	.47½
Feldspar, blk pottery . . . ton	17.00	19.00	17.00	19.00	. . .	14.50
Powd, blk, wks . . . ton	14.00	14.50	14.00	14.50	14.00	14.50
Ferric Chloride, tech, crys, 475 lb bbls . . . lb.	.05	.07½	.05	.07½	.05	.07½
sol, 42° cbys . . . lb.	.06¼	.06½	.06¼	.06½	.06¼	.06½
Fish Scrap, dried, unground, wks . . . unit *l*	. . .	2.75	2.75	3.00	. . .	. . .
Acid, Bulk, 6 & 3%, delv Norfolk & Baltimore basis . . . unit *m*	. . .	2.50	2.50	2.50	2.75	3.15
Fluorspar, 98%, bgs . . . lb.	. . .	33.00	. . .	33.00	no prices	
Formaldehyde, USP, 400 lb bbls, wks . . . lb.	.05¾	.06¼	.05¾	.06¼	.05¾	.06¼
Fossil Flour . . . lb.	.02½	.04	.02½	.04	.02¼	.04
Fullers Earth, blk, mines . . ton	10.00	11.00	10.00	11.00	6.50	15.00
Imp powd, c-l, bgs . . . ton	23.00	30.00	23.00	30.00	23.00	30.00
Furfural (tech) drs, wks . . lb.	.10	.15	.10	.15	.10	.15
Furfuramide (tech) 100 lb drs . . . lb.	. . .	.30	. . .	.30	. . .	.30
Fusel Oil, 10% impurities lb.	.12½	.14	.12½	.14	.12½	.18
Fustic, crystals, 100 lb boxes . . . lb.	.22	.26	.22	.26	.20	.26
Liquid 50°, 600 lb bbls . . lb.	.09½	.13	.09½	.13	.08½	.13
Solid, 50 lb boxes . . . lb.	.17½	.19½	.17½	.19½	.16	.19½
G SALT PASTE						
G Salt paste, 360 lb bbls . . . lb.	.45	.47	.45	.47	.45	.47
Gall Extract . . . lb.	.19	.20	.19	.20	.19	.20
Gambier, com 200 lb bgs . . lb.	.06¾	.07¾	.06¾	.07¾	. . .	nom.
Singapore cubes, 150 lb bgs . . . 100 lb.	.10½	.11	.10½	.11	.09½	.10½
Gelatin, tech, 100 lb cs . . . lb.	.45	.50	.45	.50	.45	.55
Glauber's Salt, tech, c-l, bgs, wks* . . . 100 lb.	.95	1.15	.95	1.15	.95	1.15
Anhydrous, see Sodium Sulfate.						
Glue, bone, com grades, c-l bgs . . . lb.	.13	.16½	.13	.16½	.11	.17½
Better grades, c-l, bgs lb.	.14½	.16½	.14½	.16½	.12½	.17½
Casein, kgs . . . lb.	.18	.22	.18	.22	.18	.22

l + 10; *m* + 50; *Bbls. are 20c higher.

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Glycerin, CP, 550 lb drs . . lb.	.15½	.16	.15½	.16	.15½	.29
Dynamite, 100 lb drs . . . lb.	.15½	.16	.15½	.16	.15½	.29
Saponification, drs . . . . . lb.	.10½	.11	.09½	.11¼	.11	.29
Soap Lye, drs . . . . lb.	.09½	.10	.08½	.10¼	.10	.27
Glyceryl Bori-Borate, bbls lb.	. . .	.40	. . .	.40	. . .	. . .
Monoricinoleate, bbls . . . lb.	. . .	.27	. . .	.27	. . .	. . .
Monostearate, bbls . . . . . lb.	. . .	.30	. . .	.30	. . .	. . .
Oleate, bbls . . . . lb.	. . .	.22	. . .	.22	. . .	. . .
Phthalate . . . . lb.	. . .	.37	. . .	.37	.29	.37
Glyceryl Stearate, bbls . . . . lb.	. . .	.18	. . .	.18	. . .	.18
Glycol Bori-Borate, bbls . . lb.	. . .	.26	. . .	.26	. . .	. . .
Phthalate, drs . . . . lb.	. . .	.40	. . .	.40	.29	.40
Stearate, drs . . . . lb.	. . .	.27½	. . .	.27½	.23	.27½
GUMS						
Gum Aloes, Barbadoes . . . . lb.	.85	.90	.85	.90	.85	.90
Arabic, amber sorts . . . . lb.	.10¼	.10¾	.10¼	.12	.10½	.15½
White sorts, No. 1, bgs . . lb.	.27	.28	.24	.28	.24	.30
No. 2, bgs . . . . lb.	.25	.26	.22	.26	.22	.28
Powd, bbls . . . . lb.	.13½	.14	.13½	.16	.14	.19
Asphaltum, Barbadoes (Manjak) 200 lb bgs, f.o.b., NY . . . . lb.	02½	.10½	.02½	.10½	.02½	.10½
California, f.o.b., NY, drs ton	29.00	55.00	29.00	55.00	29.00	55.00
Egyptian, 200 lb cases, f.o.b., NY . . . . lb.	.12	.15	.12	.15	.12	.15
Benzoin Sumatra, USP, 120 lb cases . . . . lb.	.17½	.19	.15	.20	.15	.25
Copal, Congo, 112 lb bgs, clean, opaque . . . . lb.	. . .	.18¾	.18¾	.19¼	.18⅞	.19¼
Dark amber . . . . lb.	. . .	.08¼	.08¼	.08⅞	.06⅞	.09¼
Light amber . . . . lb.	. . .	.12⅜	.12⅜	.13¼	.10¼	.14⅜
Copal, East India, 180 lb bgs						
Macassar pale bold . . . . . lb.	. . .	.12⅛	.12⅛	.13	. . .	.13
Chips . . . . lb.	. . .	.05⅜	. . .	.05⅜	.05⅜	.06½
Dust . . . . lb.	.03¼	.04	.03½	.04⅛	.03⅝	.04⅛
Nubs . . . . lb.	. . .	.10⅜	. . .	.10⅜	.10⅜	.11¼
Singapore, Bold . . . . lb.	. . .	.15¼	. . .	.15¼	.15¼	.15⅝
Chips . . . . lb.	. . .	.04¾	. . .	.04¾	.04¼	.05
Dust . . . . lb.	.03¼	.04	.03¼	.04⅛	.03⅝	.04⅛
Nubs . . . . lb.	. . .	.10	. . .	.10	.10	.10¾
Copal Manilla, 180-190 lb baskets, Loba A . . . . . lb	. . .	.12	. . .	.12	.09¾	.12
Loba B . . . . lb.	. . .	.11	.11	.11⅝	.09¼	.11⅝
Loba C . . . . lb	. . .	.10⅛	.10⅛	.11¼	.08⅞	.11¼
DBB . . . . lb.	. . .	.08	.08	.08¾	.08	.08¾
Dust . . . . lb.	. . .	.06⅛	.06⅛	.06⅝	.05¾	.06⅝
MA sorts . . . . lb.	. . .	.06⅛	.06⅛	.07¼	.06¾	.07¼
Copal Pontianak, 224 lb cases, bold genuine . . . . lb.	. . .	.16½	. . .	.16½	.15½	.16½
Chips . . . . lb.	. . .	.10¼	. . .	.10¼	.09⅛	.11⅛
Mixed . . . . lb.	. . .	.14	. . .	.14	.13½	.14
Nubs . . . . lb.	. . .	.12⅞	. . .	.12⅞	.12¾	.13½
Split . . . . lb.	. . .	.13⅞	. . .	.13⅞	.13½	.15¼
Dammar Batavia, 136 lb cases						
A . . . . lb.	. . .	.22⅜	.22⅜	.25½	.23½	.25½
B . . . . lb.	. . .	.21	.21	.24	.22⅛	.24
C . . . . lb.	. . .	.18⅛	.18⅛	.20⅜	.18½	.20⅜
D . . . . lb.	. . .	.15⅛	.15⅛	.17½	.15¼	.17½
A/D . . . . lb.	. . .	.17¾	.17¾	.20⅜	.17⅝	.20⅜
A/E . . . . lb.	. . .	.14½	.14½	.17¼	.14⅞	.17¼
E . . . . lb.	. . .	.07¾	.07¾	.08½	.07½	.08½
F . . . . lb.	. . .	.07¼	. . .	.07¼	.06¼	.07¼
Singapore, No. 1 . . . . . . lb.	. . .	.18⅛	.18⅛	.21⅛	.17⅛	.21½
No. 2 . . . . lb.	. . .	.12¼	.12¼	.15⅜	.14⅛	.16¼
No. 3 . . . . lb.	. . .	.05½	.05½	.05¾	. . .	.05¾
Chips . . . . lb.	. . .	.11⅝	.11⅝	.13½	.10¼	.13½
Dust . . . . lb.	. . .	.05½	.05½	.05¾	.05¾	.06
Seeds . . . . lb.	. . .	.08¼	.08¼	.09½	.07⅛	.09½
Elemi, cons . . . . lb.	. . .	.08¾	.08¾	.09½	.09⅜	.10¼
Ester . . . . lb.	.07¼	.08	.07¼	.08½	.09	.12
Gamboge, pipe, cases . . . . . lb.	.70	.75	.70	.80	.58	.80
Powd, bbls . . . . lb.	.75	.80	.75	.85	.65	.85
Ghatti, sol. bgs . . . . lb.	.11	.15	.11	.15	.11	.15
Karaya, powd, bbls, xxx . . . lb.	.27	.30	.27	.30	.24	.30
xx . . . . lb.	.18	.19	.18	.19	.16	.19
No. 1 . . . . lb.	.12	.13	.12	.13	.09½	.13
No. 2 . . . . lb.	.11	.12	.11	.12	.08½	.12
Kauri, NY, San Francisco, Brown XXX, cases . . . . . lb.	.60	.60½	.60	.60½	.60	.60½
BX . . . . lb.	. . .	.38	. . .	.38	.33	.38
B1 . . . . lb.	. . .	.28	. . .	.28	.21	.28
B2 . . . . lb.	. . .	.24	. . .	.24	.15½	.26
B3 . . . . lb.	. . .	.18½	. . .	.18½	.12	.18½
Pale XXX . . . . lb.	. . .	.61	. . .	.61	.61	.65½
No. 1 . . . . lb.	. . .	.41	. . .	.41	.40	.41
No. 2 . . . . lb.	. . .	.24	. . .	.24	.22	.24
No. 3 . . . . lb.	. . .	.17¾	. . .	.17¾	.15	.17¾
Kino, tins . . . . lb.	2.50	2.75	2.00	2.75	.70	2.10
Mastic . . . . lb.	.55	.56	.55	.56	.55	.58
Sandarac, prime quality, 200 lb bgs & 300 lb cks . . . lb.	.25	.26	.24	.26	.25	.35
Senegal, picked bags . . . . . . lb.	.25	.27	.23	.27	.20	.29
Sorts . . . . lb.	.10¼	.10½	.10¼	.12	.09¾	.15
Thus, bbls . . . . 280 lbs.	. . .	14.00	13.50	14.00	12.00	14.00
Strained . . . . 280 lbs.	. . .	14.00	. . .	14.00	12.00	14.00
Tragacanth, No. 1, cases . . lb.	2.75	3.00	2.75	3.00	2.40	3.25
No. 2 . . . . lb.	2.40	2.75	2.40	2.75	2.00	2.75
No. 3 . . . . lb.	2.35	2.70	2.35	2.70	1.95	2.70
No. 4 . . . . lb.	2.30	2.65	2.30	2.65	1.85	2.65
No. 5 . . . . lb.	2.25	2.50	2.25	2.50	1.65	2.50
Yacca, bgs . . . . lb.	.03½	.04½	.03½	.04½	.03¼	.04½
Helium, cyl (200 cu. ft.) cyl.	. . .	25.00	. . .	25.00	. . .	25.00
Hematine crystals, 400 lb bbls lb.	.18	.34	.18	.34	.16	.34
Hemlock, 25%, 600 lb bbls, wks . . . . lb.	.03	.03¼	.03	.03¼	.03	.03¼
tks . . . . lb.	. . .	.02¾	. . .	.02¾	. . .	.02¾

Prices

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Hexalene, 50 gal drs, wks lb.	...	.30	...	.30	...	.30
Hexane, normal 60-70° C.						
Group 3, tks gal.	...	.10½	...	.10½	...	.10½
Hexamethylenetetramine,						
powd, drs lb.	.35	.36	.35	.36	.35	.36
Hexyl Acetate, secondary,						
delv, drs lb.	.13	.13½	.13	.13½	.13	.13½
tks lb.	...	.12	...	.12	...	.12
Hoof Meal, f.o.b. Chicago unit	...	2.50	2.50	3.35	3.20	3.75
Hydrogen Peroxide, 100 vol,						
140 lb cbys lb.	.19½	.20	.19½	.20	.20	.21
Hydroxylamine Hydrochloride						
lb.	...	3.15	...	3.15	...	3.15
Hypernic, 51°, 600 lb bbls lb.	.16	.21	.16	.21	.15	.21
INDIGO						
Indigo, Bengal, bbls lb.	...	2.40	...	2.40	...	2.40
Synthetic, liquid lb.	.16½	.19	.16½	.19	.16½	.19
Iodine, Resublimed, kgs lb.	1.50	1.60	1.50	1.60	1.50	1.60
Irish Moss, ord, bales lb.	.10	.11	.10	.11	.11	.12
Bleached, prime, bales lb.	.19	.20	.19	.20	.19	.21
Iron Acetate Liq. 17°, bbls,						
delv lb.	.03	.04	.03	.04	.03	.04
Chloride see Ferric Chloride.						
Nitrate, coml, bbls 100 lb.	2.32	3.11	2.32	3.11	2.32	3.25
Isobutyl Carbinol (128-132° C)						
drs, wks lb.	.33	.34	.33	.34	.33	.34
tks, wks lb.	...	.32	...	.32	...	.32
Isopropyl Acetate, tks, frt						
all'd lb.	...	.05½	...	.05½	.05½	.06½
drs, frt all'd lb.	.06½	.07	.06½	.07	.06½	.08
Ether, see Ether, isopropyl.						
Keiselguhr, dom bags, c-l,						
Pacific Coast ton	22.00	85.00	22.00	85.00	22.00	85.00
LEAD ACETATE						
Lead Acetate, f.o.b. NY, bbls,						
White, broken lb.	...	.10	.10	.11	.11	.13½
cryst, bbls lb.	...	.10	.10	.11	.11	.13½
gran, bbls lb.	...	.10¾	.10¾	.11¾	.11¾	.14¼
powd, bbls lb.	...	.10¾	.10¾	.11¾	.11¾	.14¼
Arsenate, East, drs lb.	.12½	.13	.12½	.13½	.11	.13½
Linoleate, solid, bbls lb.	...	.19	...	.19	.18	.19
Metal, c-l, NY 100 lb.	...	4.00	4.00	4.90	4.75	7.05
Nitrate, 500 lb bbls, wks lb.	.10	.11½	.10	.11½	.09	.11½
Oleate, bbls lb.	.18½	.20	.18½	.20	.15	.20
Red, dry, 95% Pb_3O_4,						
delv lb.	...	.06½	.06½	.074	.07¼	.0945
97% Pb_2O_4, delv lb.	...	.06¾	.06¾	.0765	.07½	.09¾
98% Pb_2O_4, delv lb.	...	.07	.07	.0790	.07¾	.10
Resinate, precip, bbls lb.	...	.16½	...	.16½	.14	.16½
Stearate, bbls lb.	.22	.23	.22	.23	.22	.23
Titanate, bbls, c-l, f.o.b.						
wks, frt all'd lb.	.11	.11½	.11	.11½	.10	.12
White, 500 lb bbls, wks lb.	...	.06¼	.06¼	.06¾	.06¾	.09
Basic sulfate, 500 lb bbls,						
wks lb.	...	.05¾	.05¾	.06¼	.06¼	.08¾
Lime, chemical quicklime,						
f.o.b., wks, bulk ton	7.00	8.00	7.00	8.00	6.00	8.00
Hydrated, f.o.b., wks ton	8.50	12.00	8.50	12.00	8.00	12.00
Lime Salts, see Calcium Salts.						
Lime sulfur, dealers, tks gal.	.08	.11½	.08	.11½	...	.11
drs gal.	.11	.16	.11	.16	.13	.16
Linseed Meal, bgs ton	...	41.50	39.00	45.00	35.00	42.50
Litharge, coml, delv, bbls lb.	...	.05½	.05½	.064	.06¼	.08½
Lithopone, dom, ordinary,						
delv, bgs lb.	.04⅜	.04⅝	.04⅜	.04⅝	.04¼	.04⅝
bbls lb.	.04⅝	.04⅞	.04⅝	.04⅞	.04½	.04⅞
High strength, bgs lb.	.05⅞	.06⅛	.05⅞	.06⅛	.05¾	.06⅛
bbls lb.	.06⅛	.06⅜	.06⅛	.06⅜	.06	.06⅜
Titanated, bgs lb.	.05⅞	.06⅛	.05⅞	.06⅛	.05¾	.06⅛
bbls lb.	.06⅛	.06⅜	.06⅛	.06⅜	.06	.06⅜
Logwood, 51°, 600 lb bbls lb.	.09½	.11½	.09½	.11½	.08½	.11½
Solid, 50 lb boxes lb.	.15	.19	.15	.19	.15	.17½
Sticks ton	24.00	25.00	24.00	25.00	24.00	25.00
MADDER						
Madder, Dutch lb.	.22	.25	.22	.25	.22	.25
Magnesite, calc, 500 lb bbl ton	60.00	65.00	60.00	65.00	60.00	65.00
Magnesium Carb, tech, 70 lb						
bgs, wks lb.	.05¾	.06½	.05¾	.07	.06	.07
Chloride flake, 375 lb drs,						
c-l, wks ton	39.00	42.00	39.00	42.00	39.00	42.00
Fluosilicate, crys, 400 lb						
bbls, wks lb.	.10	.10½	.10	.10½	.10	.10½
Oxide, calc tech. heavy bbls,						
frt all'd lb.	.25	.30	.25½	.30½	...	...
Light, bbls, above basis lb.	.20	.25	.20	.25½	...	...
USP Heavy, bbls, above						
basis lb.	.25	.30	.25	.30½	...	...
Palmitate, bbls lb.	.33	nom.	...	.33	.33	nom.
Silicofluoride, bbls lb.	.09½	.10½	.09½	.10½	.09½	.10½
Stearate, bbls lb.	.21	.24	.21	.24	.21	.24
Manganese acetate, drs lb.	...	.26½	...	.26½	.25½	.26½
Borate, 30%, 200 lb bbls lb.	.15	.16	.15	.16	.15	.16
Chloride, 600 lb cks lb.	.09	.12	.09	.12	.09	.12
Dioxide, tech (peroxide),						
paper bgs, c-l ton	...	57.50	57.50	62.50	47.50	62.50
Hydrate, bbls lb.	...	.32	...	.32	...	.32
Linoleate, liq, drs lb.	.18	.19¼	.18	.19¼	.18	.19¼
solid, precip, bbls lb.	...	.19	...	.19	.17½	.19
Resinate, fused, bbls lb.	.08¼	.08½	.08¼	.08½	.08¼	.08½
precip, drs lb.	...	.12	...	.12	...	.12
Sulfate, tech, anhyd, 90-						
95%, 550 lb drs lb.	.07	.07½	.07	.07½	.07	.07½

Current

Mangrove
Octyl Acetate

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Mangrove, 55%, 400 lb bbls lb.	...	.04	...	.04	...	.04
Bark, African ....ton	25.00	25.50	25.00	25.50	25.00	27.00
Mannitol, pure cryst, cs, wks lb.	...	1.40	1.40	1.45	1.45	1.48
Marble Flour, blk ....ton	12.00	13.00	12.00	13.00	12.00	13.00
Mercury chloride (Calomel) lb.	...	1.28	1.18	1.59	1.05	1.60
Mercury metal ...76 lb. flasks	82.00	83.50	71.00	83.50	81.00	99.00
Meta-nitro-aniline ...... lb.	.67	.69	.67	.69	.67	.69
Meta-nitro-paratoluidine 200 lb bbls ....lb.	1.45	1.55	1.45	1.55	1.45	1.55
Meta-phenylene diamine 300 lb bbls ....lb.	.80	.84	.80	.84	.60	.84
Meta-toluene-diamine, 300 lb bbls ....lb.	.65	.67	.65	.67	.65	.67
Methanol, denat, grd, drs, c-l, frt all'd ....gal.	...	.31	.31	.36	.36	.53
tks, frt all'd ....gal.	...	.25	.25	.30	.30	.48
Pure, drs, c-l, frt all'd gal.	...	.38	...	.38	...	.38
tks ....gal.	...	.33	...	.33	...	.33
95%, tks ....gal.	...	.31	...	.31	...	.31
97%, tks ....gal.	...	.32	...	.32	..	.32
Methyl Acetate, tech, tks, delv ....lb.	...	.06½	...	.06½	...	...
55 gal drs, delv ......lb.	.07½	.08	.07½	.08	...	...
C.P. 97-99%, tks, delv lb.	...	.07	...	.07	...	...
55 gal drs, delv ......lb.	.08	.08½	.08	.08½	...	...
Acetone, frt all'd, drs gal. *p*	.30	.36	.30	.40½	.34½	.58½
tks, frt all'd, drs ....gal. *p*	.25	.29	.25	.32½	.28½	.44½
Synthetic, frt all'd, east of Rocky M., drs ....gal. *p*	.42	.51	.42	.51	.42	.59½
tks, frt all'd ....gal.	.36	.39½	.36	.39½	.36	.49½
West of Rocky M., frt all'd, drs ..gal. *p*	...	.46	...	.46	.46	.58
tks, frt all'd ..gal. *p*	...	.39½	...	.39½	.39½	.51
Anthraquinone ....lb.	.65	.67	.65	.67	.65	.67
Butyl Ketone, tks ......lb.	...	.10½	...	.10½	...	.10½
Chloride, 90 lb cyl .....lb.	.32	.40	.32	.40	.32	.43
Ethyl Ketone, tks, frt all'd lb.	...	.05½	.05½	.06	...	.07½
50 gal drs, frt all'd c-l..lb.	...	.06½	.06½	.07	...	...
Formate, drs, frt all'd ..lb.	.35	.36	.35	.36	.35	.39
Hexyl Ketone, pure, drs lb.	...	.60	...	.60	...	.60
Lactate, drs, frt all'd ...lb.	...	.30	...	.30	...	.30
Propyl carbinol, drs ....lb.	.60	.75	.60	.75	.60	.75
Mica, dry grd, bgs, wks ...lb.	...	35.00	...	35.00	...	35.00
Michler's Ketone, kgs ....lb.	...	2.50	...	2.50	...	2.50
Molasses, blacksrap, tks, f.o.b. NY ....gal.	...	.07	...	.07	.07	.07¼
Monoamylamine, c-l, drs, wks lb.	.52	1.00	.52	1.00	.52	1.00
Monobutylamine, lcl, drs, wks ....lb.	...	.65	...	.65	...	...
Monochlorobenzene, see Chlorobenzene, mono.						
Monoethanolamine, tks, wks lb.	...	.23	...	.23	.25	.30
Monomethylamine, drs, frt all'd, E. Mississippi, c-l lb.	...	.65	...	.65	...	.65
Monomethylparaminosulfate, 100 lb drs ....lb.	3.75	4.00	3.75	4.00	3.75	4.00
Myrobalans 25%, liq bbls..lb.	.03¾	.04¼	.03¾	.04¼	...	.04¼
50% Solid, 50 lb boxes..lb.	.04⅜	.05	.04⅜	.06¼	.06	.06¼
J1 bgs ....ton	...	28.50	28.00	30.00	26.50	30.00
J2 bgs ....ton	...	20.50	20.50	22.00	19.00	22.50
R2 bgs ....ton	...	20.50	20.50	22.00	18.75	22.00

NAPHTHA

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Naphtha, v.m.&p. (deodorized) see petroleum solvents.						
Naphtha, Solvent, water-white, tks ....gal.	...	.26	.26	.31	...	.31
drs, c-l ....gal.	...	.31	.31	.36	...	.36

NAPHTHALENE

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Naphthalene, dom, crude, bgs, wks ....lb.	2.35	2.70	2.35	2.70	2.00	3.00
Imported, cif, bgs ....lb.	1.75	2.15	1.75	2.25	2.20	3.00
Balls, flakes, pks ....lb.	...	.07½	.07½	.08	...	.08
Balls, ref'd, bbls, wks ..lb.	...	.06¾	.06¾	.07¼	...	.07¼
Flakes, ref'd, bbls, wks..lb.	...	.06¾	.06¾	.07¼	...	.07¼
Nickel Carbonate, bbls ....lb.	.36	.37½	.36	.37½	.36	.37½
Chloride, bbls ....lb.	.18	.20	.18	.20	.18	.20
Metal ingot ....lb.	...	.35	...	.35	...	.35
Oxide, 100 lb kgs, NY..lb.	.35	.37	.35	.37	.35	.37
Salt, 400 lb bbls, NY ...lb.	.13	.13½	.13	.13½	.13	.13½
Single, 400 lb bbls, NY lb.	.13	.13½	.13	.13½	.13	.13½
Nicotine, 40%, drs, sulfate, 55 lb drs ....lb.	...	.76	...	.76	...	.76
Nitre Cake, blk ....ton	...	16.00	...	16.00	...	16.00
Nitrobenzene, redistilled, 1000 lb drs, wks ....lb.	.08	.10	.08	.10	.08	.10
tks ....lb.	...	.07½	...	.07½	...	.07½
Nitrocellulose, c-l, l-c-l, wks lb.	.22	.29	.22	.29	.26	.29
Nitrogenous Mat'l, bgs, imp unit	...	2.35	2.35	2.65	2.55	3.55
dom, Eastern wks .....unit	...	2.60	2.50	2.75	2.50	4.25
dom, Western wks ....unit	.	2.10	2.20	2.35	2.25	3.75
Nitronaphthalene, 550 lb bbls lb.	.24	.25	.24	.25	.24	.25
Nutgalls Alleppo, bgs .....lb.	no prices		...	...	.20	.22
Chinese, bgs ....lb.	no prices		...	...	.20	.22

OAK BARK

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Oak Bark Extract, 25%, bbls lb.	...	.03⅛	...	.03⅛	...	.03⅛
tks ....lb.	...	.02¾	...	.02¾	...	.02¾
Octyl Acetate, tks, wks ...lb.	.16	.17	.16	.17	.16	.17

o Country is divided in 4 zones, prices varying by zone; *p* Country is divided into 4 zones. Also see footnote directly above; *q* Naphthalene quoted on Pacific Coast F.A.S. Phila. or N. Y.

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Orange-Mineral, 1100 lb cks NY . . . lb.	. . .	.09½	.09½	.10¼	.10¼	.12¾
Orthoaminophenol, 50 lb kgs lb.	2.15	2.25	2.15	2.25	2.15	2.25
Orthoanisidine, 100 lb drs lb.	.70	.74	.70	.74	.70	.74
Orthochlorophenol, drs . . . lb.	.35	.75	.35	.75	.35	.75
Orthocresol, drs, wks . . . lb.	.13½	.14½	.13½	.14½	.13½	.14½
Orthodichlorobenzene, 1000 lb drs . . . lb.	.06	.07	.06	.07	.05	.07
Orthonitrochlorobenzene, 1200 lb drs, wks . . . lb.	.15	.18	15	.18	.28	.29
Orthonitroparachlorphenol, tins . . . lb.	. . .	.75	. . .	.75	.70	.75
Orthonitrophenol, 350 lb drs . . . lb.	.85	.90	.85	.90	.85	.90
Orthonitrotoluene, 1000 lb drs, wks . . . lb.	.08	.10	.08	.10	.07	.10
Orthotoluidine, 350 lb bbls, l-c-l . . . lb.	.16	.17	.16	.17	.14	.17
Osage Orange, cryst, bbls . . lb.	.17	.25	.17	.25	.17	.25
51° liquid . . . lb.	.07	.08	.07	.08	.07	.08
Paraffin, rfd, 200 lb bgs						
122-127° M P . . . lb.	.043	.0435	.043	.04½	.0445	.04½
128 132° M P . . . lb.	.0445	.0455	.0445	.049	.04¾	.049
133-137° M P . . . lb.	.05	.05¼	.05	.05¾	.05½	.05¾
Para aldehyde, 99%, tech, 110-55 gal drs, delv . . lb.	. . .	.16	.16	.18	.16	.18
Aminoacetanilid, 100 lb kgs . . . lb.	. . .	.85	. . .	.85	. . .	.85
Aminohydrochloride, 100 lb kgs . . . lb.	1.25	1.30	1.25	1.30	1.25	1.30
Aminophenol, 100 lb kgs lb.	. . .	1.05	. . .	1.05	. . .	1.05
Chlorophenol, drs . . . lb.	.30	.45	.30	.45	.30	.45
Dichlorobenzene, 200 lb drs, wks . . . lb.	.11	.12	.11	.12	.11	.20
Formaldehyde, drs, wks lb.	.34	.35	.34	.35	.34	.35
Nitroacetanilid, 300 lb bbls . . . lb.	.45	.52	.45	.52	.45	.52
Nitroaniline, 300 lb bbls, wks . . . lb.	.45	.47	.45	.47	.45	.47
Nitrochlorobenzene, 1200 lb drs, wks . . . lb.	.15	.16	.15	.16	.23½	.24
Nitro-orthotoluidine, 300 lb bbls . . . lb.	2.75	2.85	2.75	2.85	2.75	2.85
Nitrophenol, 185 lb bbls lb.	.35	.37	.35	.37	.35	.37
Nitrosodimethylaniline, 120 lb bbls . . . lb.	.92	.94	.92	.94	.92	.94
Nitrotoluene, 350 lb bbls lb.	. . .	.35	. . .	.35	. . .	.35
Phenylenediamine, 350 lb bbls . . . lb.	1.25	1.30	1.25	1.30	1.25	1.30
Toluenesulfonamide, 175 lb bbls . . . lb.	.70	.75	.70	.75	.70	.75
tks, wks . . . lb.	. . .	.31	. . .	.31	. . .	.31
Toluenesulfonchloride, 410 lb bbls, wks . . . lb.	.20	.22	.20	.22	.20	.22
Toluidine, 350 lb bbls, wks . . . lb.	.56	.58	.56	.58	.56	.58
Paris Green, dealers, drs . . lb.	.23	.26	.23	.26½	.22	.26½
Pentane, normal, 28-38° C, group 3, tks . . . gal.	. . .	.08½	. . .	.08½	.08½	.09½
drs, group 3 . . . gal.	.11½	.16	.11½	.16	.12½	.16
Perchlorethylene, 100 lb drs, frt all'd . . . lb.	. . .	.10½	. . .	.10½	. . .	.10½
Petrolatum, dark amber, bbls . . . lb.	.02⅝	.02¾	.02⅝	.03⅞	.02⅝	.03
Light, bbls . . . lb.	.03⅛	.03⅜	.03⅛	.03⅜	.03⅛	.03⅜
Medium, bbls . . . lb.	.02⅞	.03⅛	.02⅞	.03⅛	.02⅞	.03⅛
Dark green, bbls . . . lb.	.02½	.02¾	.02½	.02¾	.02½	.02¾
Red, bbls . . . lb.	.02½	.03⅝	.02½	.03⅝	.02⅝	.03¾
White, lily, bbls . . . lb.	.05¼	.07⅛	.05¼	.07⅛	.06	.06¼
White, snow, bbls . . . lb.	.06¼	.08⅛	.06¼	.08⅛	.07	.07¼
Petroleum Ether, 30-60°, group 3, tks . . . gal.	. . .	.13	. . .	.13	. . .	.13
drs, group 3 . . . gal.	.14	.17	.14	.17	.15	.17

PETROLEUM SOLVENTS AND DILUENTS

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Cleaners naphthas, group 3, tks, wks . . . gal.	. . .	.06⅜	.06⅜	.07⅜	.06⅞	.07⅞
East Coast, tks, wks gal.	. . .	.10	. . .	.10	.09½	10
Hydrogenated, naphthas, frt all'd East, tks . . . gal.	. . .	.16	. . .	.16	. . .	.16
No. 2, tks . . . gal.	. . .	.18	. . .	.18	. . .	.18
No. 3, tks . . . gal.	. . .	.16	. . .	.16	. . .	.16
No. 4, tks . . . gal.	. . .	.18	. . .	.18	. . .	.18
Lacquer diluents, tks, Bayonne . . . gal.	.12	.12½	.12	.12½	.12	.12½
Group 3, tks . . . gal.	. . .	.07⅜	.07⅜	.08⅜	.07⅞	.08⅞
Naphtha, V.M.P., East, tks, wks . . . gal.	. . .	.10	.10	.11	.10	.11
Group 3, tks, wks . . . gal.	. . .	.06⅜	.06⅜	.07⅜	.06⅞	.07⅞
Petroleum thinner, 43-47, East, tks, wks . . . gal.	. . .	.09½	. . .	.09½	.09	.10
Group 3, tks, wks . . . gal.	. . .	.05⅜	.05⅜	.06⅜	.05⅞	.06⅞
Rubber Solvents, stand grd, East, tks, wks . . . gal.	.09½	.10	.09½	.10	.09½	.10
Group 3, tks, wks . . . gal.	. . .	.06⅜	.06⅜	.07⅜	.06⅞	.07⅞
Stoddard Solvent, East, tks, wks . . . gal.	. . .	.10	.09½	.10	.09½	.10
Group 3, tks, wks . . . gal.	. . .	.05⅞	.05⅞	.06⅞	.06⅜	.07⅜
Phenol, 250-100 lb drs . . . lb.	.14½	.15½	.14½	.15½	.13¼	.15½
tks, wks . . . lb.	. . .	.13½	. . .	.13½	.12¾	.13½
Phenyl-Alpha-Naphthylamine, 100 lb kgs . . . lb.	. . .	1.35	. . .	1.35	. . .	1.35
Phenyl Chloride, drs . . . lb.	. . .	.17	. . .	.17	.16	.17
Phenylhydrazine Hydrochloride, com . . . lb.	. . .	1.50	. . .	1.50	. . .	1.50

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Phloroglucinol, tech, tins . . lb.	15.00	16.50	15.00	16.50	15.00	16.50
CP, tins . . . . lb.	20.00	22.00	20.00	22.00	20.00	22.00
Phosphate Rock, f.o.b. mines						
Florida Pebble, 68% basis ton	. . .	1.85	. . .	1.85	. . .	1.85
70% basis . . . . ton	. . .	2.35	. . .	2.35	. . .	2.35
72% basis . . . . ton	. . .	2.85	. . .	2.85	. . .	2.85
75-74% basis . . . . ton	. . .	3.85	. . .	3.85	. . .	3.85
75% basis . . . . ton	. . .	5.50	. . .	5.50	. . .	5.50
Tennessee, 72% basis . . ton	. . .	4.50	. . .	4.50	. . .	4.50
Phosphorus Oxychloride 175						
lb cyl . . . . lb.	.16	.20	.16	.20	.16	.20
Red, 110 lb cases . . . . . lb.	.40	.44	.40	.44	.40	.44
Sesquisulfide, 100 lb cs . . lb.	.38	.44	.38	.44	.38	.44
Trichloride, cyl . . . . lb.	.15	.18	.15	.18	.15	.20
Yellow, 110 lb cs, wks . . lb.	.24	.30	.24	.30	.24	.33
Phthalic Anhydride, 100 lb						
drs, wks . . . . lb.	. . .	.14½	. . .	.14½	.14½	.15½
Pine Oil, 55 gal drs or bbls						
Destructive dist . . . . lb.	.52	.55	.52	.55	.49	.65
Steam dist wat wh bbls gal.	. . .	.59	. . .	.59	.59	.79
tks . . . . gal.	. . .	.54	. . .	.54	.54	.74
Pitch Hardwood, wks . . . . ton	18.25	18.75	18.25	18.75	15.00	18.75
Coaltar, bbls, wks . . . . . ton	. . .	19.00	. . .	19.00	. . .	19.00
Burgundy, dom, **bbls, wks** lb.	.05½	.06½	.05½	.06½	.03½	.06½
Imported . . . . lb.	.15	.16	.15	.16	.11	.16
Petroleum, **see Asphaltum in Gums' Section.**						
Pine, bbls . . . . bbl.	6.00	6.25	5.75	6.25	5.75	6.50
Stearin, drs . . . . lb.	.03	.04½	.03	.04½	.03	.04½
Platinum, ref'd . . . . oz.	32.00	34.00	32.00	38.00	32.00	68.00

POTASH

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Potash, Caustic, wks, sol . . lb.	.06¼	.06½	.06¼	.06½	.06¼	.06½
flake . . . . lb.	.07	.07⅓	.07	.07⅓	.07	.07⅓
Liquid, tks . . . . lb.	. . .	.02⅞	. . .	.02⅞	. . .	.02⅞
Manure Salts, imported						
30% basis, blk . . . . . unit	. . .	.58½	.	.58½	.55	.58½
Potassium Abietate, bbls . . lb.	. . .	.08	.08	.13	. . .	. . .
Acetate, tech, bbls, delv lb.	. . .	.26	.26	.28	.26	.28
Bicarbonate, USP, 320 lb						
bbls . . . . lb.	. . .	.18	. . .	.18	.09	.18
Bichromate Crystals, 725 lb						
cks* . . . . lb.	.08¾	.09¼	.08¾	.09¼	.08¾	.09
Binoxalate, 300 lb bbls . . lb.	. . .	.23	. . .	.23	. . .	.23
Bisulfate, 100 lb kgs . . . lb.	.15½	.18	.15½	.18	.15½	.18
Carbonate, 80-85% calc 800						
lb cks . . . . lb.	.06½	.07	.06½	.07	.06½	.07
liquid, tks . . . . lb.	. . .	.02⅞	. . .	.02⅞	.02¾	.02⅞
drs, wks . . . . lb.	.03	.03½	.03	.03½	.02⅞	.03½
Chlorate crys, 112 lb kgs,						
wks . . . . lb.	.09¼	.09½	.09¼	.09½	.09¼	.09½
gran, kgs . . . . lb.	.12	.13	.12	.13	.12	.13
powd, kgs . . . . lb.	.08½	.08¾	.08½	.08¾	.08½	.08¾
Chloride, crys, bbls . . . . lb.	.04	.04¾	.04	.04¾	.04	.04¾
Chromate, kgs . . . . lb.	.19	.28	.19	.28	.28	.29
Cyanide, 110 lb cases . . . lb.	.50	.55	.50	.57½	.55	.57½
Iodide, 75 lb bbls . . . . . . lb.	.93	1.00	.93	1.00	.93	1.15
Metabisulfite, 300 lb bbls lb.	.13	.15	.13	.15	.11	.15
Muriate, bgs, dom, blk unit	. . .	.53½	. . .	.53½	.50	.53½
Oxalate, bbls . . . . lb.	.25	.26	.25	.26	.25	.26
Perchlorate, kgs, wks . . . lb.	.09	.10½	.09	.11½	.09½	.11
Permanganate, USP, crys,						
500 & 1000 lb drs, wks lb.	.18½	.19½	.18½	.19½	.18½	.19½
Prussiate, red, bbls . . . . . lb.	.35	.37	.35	.37	.35	.37
Yellow, bbls . . . . lb.	.15	.16	.15	.16	.15	.18
Sulfate, 90% basis, bgs ton	. . .	38.00	. . .	38.00	. . .	36.25
Titanium Oxalate, 200 lb						
bbls . . . . lb.	.35	.40	.35	.40	.33	.40
Pot & Mag Sulfate, 48% basis						
bgs . . . . ton	. . .	25.75	. . .	25.75	24.75	25.75
Propane, group 3, tks . . . . lb.	.03	.04⅛	.03	.04⅛	.03	.04⅛
Putty, coml, tubs . . . . . 100 lb.	. . .	3.00	2.25	3.00	2.90	3.00
Linseed Oil, kgs . . . 100 lb.	. . .	4.50	4.00	4.65	4.65	4.75
Pyrethrum, conc liq:						
2.4% pyrethrins, drs, frt						
all'd . . . . gal.	6.40	6.75	5.00	6.75	4.15	5.25
3.6% pyrethrins, drs, frt						
all'd . . . . gal.	9.60	9.95	7.65	9.95	6.10	7.85
Flowers, coarse, Japan,						
bgs . . . . lb.	. . .	.23¾	.18	.23¾	.12¾	.18
Fine powd, bbls . . . . . . lb.	. . .	.25¼	.19	.25¼	.14	.19
Pyridine, denat, 50 gal drs gal.	. . .	1.55	. . .	1.55	1.30	1.55
Refined, drs . . . . lb.	. . .	.45	. . .	.45	. . .	. . .
Pyrites, Spanish **cif Atlantic**						
ports, blk . . . . unit	.12	.13	.12	.13	.12	.13
Pyrocatechin, CP, drs, tins lb.	2.15	2.75	2.15	2.75	2.15	2.75
Quebracho, 35% liq tks . . . lb.	. . .	.03	. . .	.03	.02⅞	.03
450 lb bbls, c-l . . . . lb.	. . .	.03½	. . .	.03½	.03½	.03⅞
Solid, 63%, **100 lb bales**						
cif . . . . lb.	. . .	.04	. . .	.04	.03⅞	.04
Clarified, 64%, bales . . lb.	. . .	.04¼	. . .	.04¼	.04¼	.04⅜
Quercitron, 51 deg liq, 450 lb						
bbls . . . . lb.	.06	.06½	.06	.06½	.06	.06½
Solid, drs . . . . lb.	.10	.12	.10	.12	.10	.12

R SALT

	Current Market		1938 Low	1938 High	1937 Low	1937 High
R Salt, 250 lb bbls, wks . . . lb.	.52	.55	.52	.55	.52	.55
Resorcinol tech, cans . . . . . lb.	.75	.80	.75	.80	.75	.80
Rochelle Salt, cryst . . . . . . lb.	.17¾	.18¼	.15	.18¼	.14½	.15½
Powd, bbls . . . . lb.	.16¾	.17¼	.16	.18½	.13½	.16½
Rosin Oil, bbls, first run gal.	.45	.47	.45	.60	.52	.73
Second run . . . . gal.	.47	.49	.47	.62	.54	.75
Third run, drs . . . . gal.	.51	.53	.51	.66	.58	.79

* Spot price is ⅛c higher.

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Rosins 600 lb bbls, 280 lb unit ex. yard NY:†						
B	...	4.65	4.65	6.00	5.50	10.00
D	...	4.90	4.90	6.00	5.50	10.35
E	...	4.95	4.95	6.00	5.75	10.25
F	...	5.30	5.30	7.00	6.87½	10.80
G	...	5.50	5.50	7.05	6.87½	10.85
H	5.55	5.65	5.55	7.15	6.90	10.85
I	5.60	5.65	5.60	7.15	6.95	10.90
K	5.65	5.70	5.65	7.25	6.95	10.90
M	5.65	5.70	5.65	7.40	7.05	11.00
N	...	6.20	6.20	7.50	7.10	11.05
WG	...	6.80	6.80	8.45	7.65	11.75
WW	...	7.75	7.70	9.15	8.00	13.75
Rosins, Gum, Savannah (280 lb unit):†						
B	...	3.25	3.25	4.60	4.25	8.75
D	...	3.50	3.50	4.60	4.25	9.00
E	...	3.55	3.55	4.60	4.25	9.10
F	...	3.90	3.90	5.60	5.50	9.55
G	...	4.10	4.10	5.65	5.60	9.60
H	...	4.20	4.20	5.75	5.70	9.60
I	...	4.20	4.20	5.85	5.70	9.65
K	...	4.20	4.20	6.00	5.70	9.65
M	...	4.20	4.20	6.15	5.80	9.75
N	...	4.80	4.80	6.20	5.85	9.75
WG	...	5.40	5.40	7.05	6.40	10.50
WW	...	6.10	6.10	7.75	6.75	12.50
X	...	6.10	6.10	7.75	6.75	12.50
Rosin, Wood, c-l, FF grade, NY	...	5.05	5.05	6.40	6.40	10.72
Rotten Stone, bgs mines ..ton	...	**35.00**	...	**35.00**	...	**35.00**
Imported, lump, bbls ...lb.	...	**.12**	...	**.12**	...	...
Powdered, bbls ......lb.	**.08½**	**.10**	**.08½**	**.10**	...	...

SAGO FLOUR

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Sago Flour, 150 lb bgs ...lb.	.02½	.03½	.02½	.03¾	.02¾	.03¾
Sal Soda, bbls, wks ...100 lb.	...	1.20	...	1.20	1.15	1.20
Salt Cake, 94-96%, c-l, wks ton	19.00	23.00	19.00	23.00	19.00	23.00
Chrome, c-l, wks ......ton	11.00	12.00	11.00	12.00	11.00	12.00
Saltpetre, gran, 450-500 lb bbls ....lb.	.06½	.069	.06½	.069	.06	.069
Cryst, bbls ....lb.	.07½	.0865	.07½	.0865	.07	.0865
Powd, bbls ....lb.	.07½	.079	.07½	.079	.07	.079
Satin, White, pulp, 550 lb bbls ....lb.	.01¼	.01½	.01¼	.01½	.01¼	.01½
Schaeffer's Salt, kgs ......lb.	.46	.48	.46	.48	.46	.48
Shellac, Bone dry, bbls ..lb. r	.17	.17½	.16½	.17½	.17	.22
Garnet, bgs ....lb.	.13½	.14	.13½	.15	.14	.17
Superfine, bgs ....lb. s	.11½	.12	.11½	.13½	.13	.18½
T. N., bgs ....lb. s	.11	.11½	.11	.12½	.12	.14½
Silver Nitrate, vials ......oz.	...	.31½	.31½	.34⅞	.32⅝	.35½
Slate Flour, bgs, wks ....ton	9.00	10.00	9.00	10.00	9.00	10.00
Soda Ash, 58% dense, bgs,						
c-l, wks ....100 lb.	...	1.10	...	1.10	...	1.10
58% light, bgs .....100 lb.	...	1.08	...	1.08	...	1.08
blk ....100 lb.	...	.90	...	.90	...	.90
paper bgs ....100 lb.	...	1.05	...	1.05	...	1.05
bbls ....100 lb.	...	1.35	...	1.35	...	1.35
Caustic, 76% grnd & flake, drs ....100 lb.	...	2.70	...	2.70	...	2.70
76% solid, drs .....100 lb.	...	2.30	...	2.30	...	2.30
Liquid sellers, tks ..100 lb.	...	1.97½	...	1.97½	...	1.97½
Sodium Abietate, drs .....lb.	...	.10	.10	.13	.08	.13
Acetate, 60% tech, gran, powd, flake, 450 lb bbls, wks ....lb.	.04	.05	.04	.05	.04¼	.05
anhyd, drs, delv .....lb.	...	.08¼	...	.08¼	...	...
Alignate, drs ....lb.	...	.69	...	.69	.64	.69
Antimoniate, bbls ......lb.	.12⅜	.12⅞	.12⅜	.15¼	.13¾	.16¼
Arsenate, drs ....lb.	.08	.08½	.08	.08½	.08	.11½
Arsenite, liq, drs ......gal.	.30	.33	.30	.33	.33	.40
Dry, gray, drs, wks ..lb.	.07½	.09½	.07½	.09½	...	...
Benzoate, USP, kgs ....lb.	.46	.48	.46	.48	.46	.48
Bicarb, powd, 400 lb bbl, wks ....100 lb.	...	1.85	...	1.85	1.75	1.85
Bichromate, 500 lb cks, wks* ....lb.	.06¾	.07¼	.06¾	.07¼	.06½	.07¼
Bisulfite, 500 lb bbl, wks lb.	.03¼	.036	.03¼	.036	.03¼	.036
35-40% sol bbls, wks 100 lb.	1.40	1.80	1.40	1.80	...	...
Chlorate, bgs, wks ......lb.	.06¼	.07½	.06¼	.07½	.06¼	.07½
Cyanide, 96-98%, 100 & 250 lb drs, wks ......lb.	.14	.15	.14	.17½	.15½	.17½
Diacetate, 33-35% acid, bbls, lcl, delv ....lb.	...	.09	...	.09	...	...
Fluoride, white 90%, 300 lb bbls, wks ....lb.	.07½	.08¼	.07½	.08¼	.07½	.08¼
Hydrosulfite, 200 lb bbls, f.o.b. wks ....lb.	.16	.17	.16	.17	.16	.17
Hyposulfite, tech, pea crys 375 lb bbls, wks 100 lb.	...	2.80	2.50	2.80	2.50	3.00
Tech, reg cryst, 375 lb bbls, wks ......100 lb.	2.45	2.80	2.40	2.80	2.40	2.75
Iodide ....lb.	1.90	1.95	1.90	1.95	1.90	1.95
Metal, drs, 280 lbs. ......lb.	...	.19	...	.19	...	.19
Metanilate, 150 lb bbls ..lb.	.41	.42	.41	.42	.41	.42
Metasilicate, gran, c-l, wks ....100 lb.	...	2.20	2.15	2.20	...	2.15
cryst, bbls, c-l, wks 100 lb.	...	2.90	2.75	2.90	...	2.75
Monohydrate, bbls .....lb.	...	.023	...	.023	...	.023
Naphthenate, drs ..... lb.	.12	.19	.12	.19	.09	.19
Naphthionate, 300 lb bbl lb.	.52	.54	.52	.54	.52	.54

r Bone dry prices at Chicago 1c higher; Boston ½c; Pacific Coast 2c; Philadelphia deliveries f.o.b. N. Y.; refined 6c higher in each case; s T. N. and Superfine prices quoted f.o.b. N. Y. and Boston; Chicago prices 1c higher; Pacific Coast 3c; Philadelphia f.o.b. N. Y. * Spot price is ⅛c higher; † Closing prices Nov. 26th.

Current

Sodium Nitrate
Tartar Emetic

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Sodium (continued):						
Nitrate, 92%, crude, 200 lb bgs, c-l, NY ....ton	...	28.30	...	28.30	26.80	28.30
100 lb bgs ....ton	...	29.00	...	29.00	27.50	29.00
Bulk ....ton	...	27.00	...	27.00	25.50	27.00
Nitrite, 500 lb bbls .....lb.	.06¾	.11½	.06¾	.11½	.07	.10
Orthochlorotoluene, sulfonate, 175 lb bbls, wks ..lb.	.25	.27	.25	.27	.25	.27
Perborate, drs, 400 lbs ..lb.	.14¾	.15¼	.14¾	.15¼	.14¾	.15¼
Peroxide, bbls, 400 lb ...lb.	...	.17	...	.17	...	.17
Phosphate, di-sodium, tech, 310 lb bbls, wks 100 lb.	...	2.05	...	2.05	1.90	2.05
bgs, wks ......100 lb.	...	1.85	...	1.85	1.70	1.85
Tri-sodium, tech, 325 lb bbls, wks ....100 lb.	...	2.20	...	2.20	2.05	2.20
bgs, wks ....100 lb.	...	2.00	...	2.00	1.85	2.00
Picramate, 160 lb kgs ...lb.	.65	.67	.65	.67	.65	.67
Prussiate, Yellow, 350 lb bbl. wks ....lb.	.10	.11½	.10	.11½	.10	.11½
Pyrophosphate, anhyd, 100 lb bbls ....lb.	...	.10	...	.10	...	.10
Sesquisilicate, drs, c-l, wks ....100 lb.	...	3.00	...	3.00	...	...
Silicate, 60°, 55 gal drs, wks ....100 lb.	1.65	1.70	1.65	1.70	1.65	1.70
40°, 35 gal drs, wks 100 lb.	...	.80	...	.80	...	.80
tks, wks ....100 lb.	...	.65	...	.65	...	.65
Silicofluoride, 450 lb bbls NY ....lb.	.05¾	.06	.05¾	.06½	.05¾	.07
Stannate, 100 lb drs ....lb.	.25½	.28½	.25½	.32	.28	.44
Stearate, bbls ....lb.	...	.24	...	.24	.19	.24
Sulfanilate, 400 lb bbls lb.	.16	.18	.16	.18	.16	.18
Sulfate Anhyd, 550 lb bgs* c-l, wks ....100 lb. ‡	1.45	1.90	1.45	1.90	1.45	1.90
Sulfide, 80% cryst, 440 lb bbls, wks ....lb.	...	.02¼	...	.02¼	...	.02¼
Solid, 650 lb drs, c-l, wks ....lb.	...	.03	...	.03	...	.02
Sulfite, cryst, 400 lb bbls, wks ....lb.	.023	.02½	.023	.02½	.023	.02½
Sulfocyanide, drs ......lb.	.28	.47	.28	.47	.28	.47
Sulforicinoleate, bbls ...lb.	...	.12	...	.12	...	.12
Tungstate, tech, crys, kgs lb.	...	nom.	...	...	.85	.90
Sorbitol, com, solut., wks, c-l drs, wks ....lb.	...	.18	.18	.19	...	.25
Spruce Extract, ord, tks ..lb.	...	.01⅛	...	.01⅛	.01	.01⅛
Ordinary, bbls ....lb.	...	.01⅝	...	.01⅝	.01½	.01⅝
Super spruce ext, tks ...lb.	...	.01⅜	...	.01⅜	.01⅜	.01⅝
Super spruce ext, bbls ..lb.	...	.01⅞	...	.01⅞	...	.01⅞
Super spruce ext, powd, bgs ....lb.	...	.04	...	.04	.04	.04¼
Starch, Pearl, 140 lb bgs 100 lb.	2.65	2.85	2.60	3.18	2.93	4.53
Powd, 140 lb bgs ...100 lb.	2.75	2.95	2.70	3.28	3.03	4.63
Potato, 200 lb bgs ......lb.	.04	.05	.03½	.05½	.04½	.05½
Imp, bgs ....lb.	.05	.06	.05	.06	.05	.06
Rice, 200 lb bbls ....lb.	.06¼	.07¼	.06¼	.07¼	...	.07¼
Wheat, thick, bgs ......lb.	.06¼	nom.	.06¼	.07	.07	.08½
Strontium carbonate, 600 lb bbls, wks ....lb.	.07¼	.07½	.07¼	.07½	.07¼	.07½
Nitrate, 600 lb bbls, NY lb.	.08¼	.09¼	.07¾	.09¼	.07¾	.08¼
Sucrose octa-acetate, den, grd, bbls, wks ....lb.	...	.45	...	.45	...	.45
tech, bbls, wks ....lb.	...	.40	...	.40	...	.40
Sulfur, crude, f.o.b. mines ton	18.00	19.00	18.00	19.00	18.00	19.00
Flour, coml, bgs ....100 lb.	1.65	2.35	1.65	2.35	1.65	2.35
bbls ....100 lb.	1.95	2.70	1.95	2.70	1.95	2.70
Rubbermakers, bgs..100 lb.	2.20	2.80	2.20	2.80	2.20	2.80
bbls ....100 lb.	2.55	3.15	2.55	3.15	2.55	3.15
Extra fine, bgs .....100 lb.	2.85	3.00	2.85	3.00	2.85	3.00
Superfine, bgs ......100 lb.	2.65	2.80	2.65	2.80	2.65	2.80
bbls ....100 lb.	2.25	3.10	2.25	3.10	2.25	3.10
Flowers, bgs ....100 lb.	3.00	3.75	3.00	3.75	3.00	3.75
bbls ....100 lb.	3.35	4.10	3.35	4.10	3.35	4.10
Roll, bgs ....100 lb.	2.35	3.10	2.35	3.10	2.35	3.10
bbls ....100 lb.	2.50	3.25	2.50	3.25	2.50	3.25
Sulfur Chloride, 700 lb drs, wks ....lb.	.03	.04	.03	.04	.02½	.04
Sulfur Dioxide, 150 lb cyl..lb.	.07	.09	.07	.09	.07	.09
Multiple units, wks .....lb.	.04½	.07	.04½	.07	.04½	.07
tks, wks ....lb.	.04	.05	.04	.05	.04	.05
Refrigeration, cyl, wks..lb.	.16	.17	.16	.17	.15	.17
Multiple units, wks ....lb.	.07½	.10	.07½	.10	.07½	.10
Sulfuryl Chloride ....lb.	.15	.40	.15	.40	.15	.40
Sumac, Italian, grd ......ton	...	63.50	62.00	66.00	58.50	65.00
Extract, 42°, bbls ......lb.	.05¼	.06¼	.05¼	.06¼	.05¼	.06¼
Superphosphate, 16% bulk, wks ....ton	...	8.50	8.50	9.00	8.25	9.00
Run of pile ....ton	...	8.00	8.00	8.50	8.00	8.50
Triple, 44-45%, a. p. a. bulk, wks, Balt. unit ......ton	...	.85	...	.85	.70	.85
Talc, Crude, 100 lb bgs, NY ton	13.00	15.00	13.00	15.00	13.00	15.00
Ref'd, 100 lb bgs, NY ton	14.00	16.00	14.00	16.00	14.00	16.00
French, 220 lb bgs, NY ton	23.00	30.00	23.00	30.00	23.00	30.00
Ref'd, white, bgs, NY ton	45.00	60.00	45.00	60.00	45.00	60.00
Italian, 220 lb bgs to arr ton	60.00	62.00	60.00	62.00	60.00	62.00
Ref'd, white, bgs, NY ton	65.00	70.00	65.00	70.00	65.00	70.00
Tankage Grd, NY .....unit ‖	...	2.50	2.50	3.00	3.00	4.40
Ungrd ....unit ‖	...	2.35	2.35	2.90	2.80	4.35
Fert grade, f.o.b. Chgo unit ‖	...	2.25	2.25	2.75	2.75	4.00
South American cif ..unit ‖	...	3.00	3.00	3.45	3.15	4.25
Tapioca Flour, high grade, bgs ....lb.	.03¼	.05½	.03¼	.05½	.03¼	.05½
Tar Acid Oil, 15%, drs ..gal.	.22½	.25½	.22½	.25½	.21	.25½
25%, drs ....gal.	.26½	.29½	.26½	.29½	.24½	.29½
Tar, pine, delv, drs .....gal.	...	.26	...	.26	...	.26
tks, delv, E. cities .....gal.	...	.20	...	.20	...	.20
Tartar Emetic, tech, bbls..lb.	.27¾	.28	.26¾	.28	.24¾	.27
USP, bbls ....lb.	.33	.33½	.32	.33½	.30	.32½

‡ Bags 15c lower; ‖ + 10; *Bbls. are 20c higher.

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Terpineol, den grade, drs . . lb.	...	.17	...	.17	.13¾	.14¾
Tetrachlorethane, 650 lb drs lb.	.08	.08½	.08	.08½	.08	.08½
Tetrachloroethylene, drs, tech . . . . . . lb.	...	.09½	...	.09½	...	.10½
Tetralene. 50 gal drs, wks lb.	.12	.13	.12	.13	.12	.13
Thiocarbanilid, 170 lb bbls . . lb.	.20	.25	.20	.25	.20	.25
Tin, crystals, 500 lb bbls, wks lb.	.31	.31½	.31	.34½	.33	.46
Metal, NY . . . . lb.	...	.3570	.3570	.4295	.41	.66
Oxide, 300 lb bbls, wks . . lb.	.44	.46	.44	.50	.48	.62
Tetrachloride, 100 lb drs, wks . . . . . . lb.	...	.18½	.18½	.21¾	.21	.32
Titanium Dioxide, 300 lb bbls lb.	.16¼	.17	.16¼	.17	.16¼	.17
Barium Pigment, bbls . . lb.	.06⅛	.06⅜	.06⅛	.06⅜	.06	.06⅜
Calcium Pigment, bbls . . lb.	.06⅛	.06⅜	.06⅛	.06⅜	.06	.06⅜
Toluidine, mixed, 900 lb drs, wks . . . . . . lb.	.26	.27	.26	.27	.26	.27
Toluol, 110 gal drs, wks . . gal.	...	.27	.27	.35	...	.35
8000 gal tks, frt all'd . . gal.	...	.22	.22	.30	...	.30
Toner Lithol, red, bbls . . . . lb.	.75	.80	.75	.80	.75	.80
Para, red, bbls . . . . lb.	.75	.80	.75	.80	...	.75
Toluidine, bgs . . . . lb.	...	1.35	...	1.35	...	1.35
Triacetin, 50 gal drs, wks lb.	...	.36	...	.36	...	.36
Triamyl Borate, lcl, drs, wks lb.	...	.27	...	.27	...	.27
Triamylamine, c-l, drs, wks lb.	.77	1.25	.77	1.25	.77	1.25
Tributylamine, lcl, drs, wks lb.	...	.70	...	.70	...	...
Tributyl citrate, drs, frt all'd lb.	...	.45	...	.45	...	.45
Tributyl Phosphate, frt all'd lb.	...	.50	...	.50	...	.50
Trichlorethylene, 600 lb drs, frt all'd E. Rocky Mts . . lb.	.089	.094	.089	.094	.089	.094
Tricresyl phosphate, tech, drs lb.	.24½	.39	.24½	.39	.22½	.26½
Triethanolamine, 50 gal drs wks . . . . lb.	.21	.22	.21	.22	.21	.30
tks, wks . . . . lb.	...	.20	...	.20	.20	.25
Triethylene glycol, drs, wks lb.	...	.26	...	.26	...	...
Trihydroxyethylamine Oleate, bbls . . . . lb.	...	.30	...	.30	...	...
Stearate, bbls . . . . lb.	...	.30	...	.30	...	...
Trimethylamine, c-l, drs, frt all'd E. Mississippi . . . . . lb.	...	1.00	...	1.00	...	1.00
Triphenylguanidine . . . . . . lb.	.58	.60	.58	.60	.58	.60
Triphenyl Phosphate, drs . . lb.	...	.38	.34	.38	...	...
Tripoli, airfloated, bgs, wks ton	26.00	30.00	26.00	30.00	25.00	30.00
Turpentine (Spirits), c-l, NY dock, bbls . . . . gal.	...	.28½	.27½	.31½	.31	.47
Savannah, bbls . . . . . . gal.	...	.22¼	.22¼	.30¾	.25	.42
Jacksonville, bbls . . . . . gal.	...	.22½	.22½	.30¾	.25	.41
Wood Steam dist, bbls, c-l, NY . . . . gal.	...	.27	.27	.31	.30	.44
Wood, dest dist, c-l, drs, delv E. cities . . . . **gal.**	...	.36	.33	.36	...	...
Urea, pure, 112 lb cases . . lb.	.14½	.15½	.14½	.15½	.14½	.15½
Fert grade, bgs, c.i.f. . . ton	...	...	...	...	...	...
c.i.f. S.A. points . . . ton	95.00	110.00	95.00	110.00	95.00	110.00
Dom, f.o.b., wks . . . . ton	95.00	101.00	95.00	101.00	95.00	101.00
Urea Ammonia liq 55% NH_3, tks . . . . unit	...	1.04	...	1.04	1.00	1.04
Valonia beard, 42%, tannin bgs . . . . ton	..	47.00	47.00	52.00	35.00	52.00
Cups, 32% tannin, bgs . ton	33.00	35.00	33.00	37.50	31.50	36.00
Extract, powd, 63% . . . . lb.	...	.06	...	.06	...	...
Vanillin, ex eugenol, 25 lb tins, 2000 lb lots . . . . . lb.	...	2.35	2.35	3.10	3.10	3.65
Ex-guaiacol . . . . lb.	...	2.25	2.25	3.00	3.00	3.55
Vermilion, English, kgs . . lb.	1.55	1.69	1.45	1.69	1.60	1.90
Wattle Bark, bgs . . . . ton	39.75	41.75	39.75	41.75	31.00	43.75
Extract, 60°, tks, bbls . . lb.	...	.04⅜	.04⅜	.04⅝	.03⅝	.04⅝
WAXES						
Wax, Bayberry, bgs . . . . . lb.	.16⅞	.17	.16⅞	.17	.16½	.17½
Bees, bleached, white 500 lb slabs, cases . . . . . . lb.	.37	.39	.35	.45	.38	.45
Yellow, African, bgs . . lb.	.22	.25½	.22	.26	.25	.30
Brazilian, bgs . . . . . lb.	.23	.25	.23	.29	.27	.34
Chilean, bgs . . . . . . lb.	.23	.25	.23	.29	.27	.34
Refined, 500 lb slabs, cases lb.	.33	.33½	.32	.39	.29½	.39
Candelilla, bgs . . . . lb.	.14½	.15	.13½	.15	.13	.16½
Carnauba, No. 1, yellow, bgs . . . . **lb.**	.38	.39½	.38	.44	.42	.49
No. 2, yellow, bgs . . . . lb.	.37	.37½	.36	.42	.41	.46½
No. 2, N. C., bgs . . . . . lb.	.35½	.36	.35½	.40	.38	.43
No. 3, Chalky, bgs . . . lb.	.32½	.34	.31½	.35	.33	.40
No. 3, N. C., bgs . . . . . lb.	.32½	.34	.31½	.35½	.34	.43
Ceresin, dom, bgs . . . . . . lb.	.08½	.11½	.08½	.11½	.08	.12
Japan, 224 lb cases . . . . . lb.	.09½	.10	.09½	.10½	.09½	.11¼
Montan, crude, bgs . . . . . lb.	.11	.12	.11	.12	.11	.12
Paraffin, see Paraffin Wax.						
Spermaceti, blocks, cases lb.	.23	.24	.23	.24	.23	.24
Cakes, cases . . . . lb.	.24	.25	.24	.25	.24	.25
Whiting, chalk, com, 200 lb bgs c-l, wks . . . . ton	12.00	14.00	12.00	14.00	12.00	14.00
Gilders, bgs, c-l, wks . . ton	...	15.00	...	15.00	...	15.00
Wood Flour, c-l, bgs . . . . ton	20.00	33.00	20.00	33.00	18.00	30.00
Xylol, frt allowed, East 10° tks, wks . . . . gal.	...	.29	.29	.33	...	.33
Coml, tks, wks, frt all'd gal.	...	.26	.26	.30	...	.30
Xylidine, mixed crude, drs lb.	.35	.36	.35	.36	.35	.36
Zinc Acetate, tech, bbls, lcl, delv . . . . **lb.**	...	.21	...	.21	...	...
Arsenate, bgs, frt all'd . . lb.	.12½	.13	.12½	.13½	...	...
Arsenite, bgs, frt all'd . . lb.	.12½	.13	.12½	.13	...	...
Carbonate tech, bbls, NY lb.	.14	.15	.14	.15	.12	.15
Chloride fused, 600 lb drs, wks . . . . lb.	.04½	.046	.04½	.046	.04½	.046
Gran, 500 lb drs, wks lb.	.05	.05¼	.05	.05¼	.05	.05¼
Soln 50%, tks, wks 100 lb.	...	2.25	...	2.25	2.00	2.25
Cyanide, 100 lb drs . . . . . lb.	...	.33	.33	.38	.36	.38
Dust, 500 lb bbls, c-l, delv lb.	...	.06	.06	.0740	.0740	.094
Metal, high grade slabs, c-l, NY . . . . 100 lb.	...	4.50	4.35	5.35	5.35	7.85
E. St. Louis . . . 100 lb.	...	4.15	4.00	5.00	5.00	7.50

Current

Zinc Oxide
Oil, Whale

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Zinc (continued):						
Oxide, Amer, bgs, wks . . lb.	.06¼	.07½	.06	.07½	.05¼	.07¾
French 300 lb bbls, wks lb.	.06¼	.07¾	.06¼	.07¾	.05½	.07¾
Palmitate, bbls . . . . lb.	.23	.25	.23	.25	.23	.25
Resinate, fused, pale, bbls lb.	. . .	.10	. . .	.10	.09	.10
Stearate, 50 lb bbls . . . . . lb.	.20	.23	.20	.23	.20	.23
Zinc Sulfate, crys, 400 lb bbl,						
wks . . . . lb.	. . .	.029	.029	.033	.028	.033
Flake, bbls . . . . lb.	. . .	.0325	.0325	.0375	.032	.0375
Sulfide, 500 lb bbls, delv lb.	.09¼	.09¾	.09¼	.09¾	.09¼	.09¾
bgs, delv . . . . lb.	.09	.09½	.09	.09½	.09	.09½
Sulfocarbolate, 100 lb kgs						
. . . . lb.	.24	.26	.24	.26	.24	.26
Zirconium Oxide, crude, 73-75%						
grd, bbls, wks . . . . ton	75.00	100.00	75.00	100.00	. . .	. . .
kgs, wks . . . . lb.	.04¼	.04½	.04¼	.04½	. . .	. . .

Oils and Fats

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Babassu, tks, futures . . . . . lb.	. . .	.06¼	.06¼	.06¾	.06¾	.11¼
Castor, No. 3, 400 lb bbls . . lb.	.09¼	.10	.09¼	.10¾	.10¼	.10¾
Blown, 400 lb bbls . . . . . lb.	.11¼	.12	.11¼	.13	.12¼	.13
China Wood, drs, spot NY lb.	.10¼	.10½	.10¼	.15¼	.12½	.23
Tks, spot NY . . . . lb.	.095	.097	.095	.15½	.118	.23
Coast, tks . . . . lb.	. . .	nom.	. . .	. . .	.133	.23
Coconut, edible, bbls NY . . lb.	. . .	.09	.09	.09½	.09½	.15
Manila, tks, NY . . . . lb.	. . .	.03¼	.03¼	.04¼	.04	.09½
Tks, Pacific Coast . . . . lb.	. . .	.03	.03	.03¾	.03¾	.08⅞
Cod, Newfoundland, 50 gal						
bbls . . . . gal.	.50	nom.	.50	.52	.51	.52
Copra, bgs, NY . . . . lb.	. . .	.0185	.0185	.0235	.0235	.055
Corn, crude, tks, mills . . . . lb.	.07	.07⅛	.06⅝	.07¾	.06½	.10¾
Refd, 375 lb bbls, NY . . lb.	.09½	.09¾	.09¼	.10¼	.09	.13¼
Degras, American, 50 gal bbls.						
NY . . . . lb.	07¾	.08¼	.07½	.08¼	.07½	.08¼
English, bbls, NY . . . . . . lb.	.07¾	.08¼	.07½	.08¼	.07½	.08¼
Greases, Yellow . . . . lb.	.03½	.03¾	.03½	.05½	.04¼	.09
White, choice bbls, NY . . lb.	. . .	.05	.05	.07	.06¾	.10¼
Lard Oil, edible, prime . . . . lb.	. . .	.11½	.11⅛	.12¾	.12¾	.16¾
Extra, bbls . . . . lb.	. . .	.09⅛	.09⅛	.10¾	.10¾	.13½
Extra, No. 1, bbls . . . . . lb.	. . .	.08⅞	.08⅞	.09¾	.09¼	.13½
Linseed, Raw less than 5 bbl						
lots . . . . lb.	. . .	.098	.098	.115	.107	.121
bbls, c-l, spot . . . . lb.	. . .	.09	.09	.102	.099	.113
Tks . . . . lb.	. . .	.084	.084	.096	.093	.107
Menhaden, tks, Baltimore gal.	.35	nom.	.34½	.37½	.34	.45
Refined, alkali, drs . . . . . lb.	.083	.085	.08	.095	.08	.10
Tks . . . . lb.	. . .	.077	.074	.087	.074	.09
Kettle bodied, drs . . . . . . lb.	.092	.095	.09	.105	.09	.11
Light pressed, drs . . . . . . lb.	.077	.079	.074	.091	.074	.094
Tks . . . . lb.	. . .	.07	.067	.08	.067	.084
Neatsfoot, CT, 20°, bbls, NY						
. . . . lb.	. . .	.16¼	.16¼	.17¼	.16¾	.18¼
Extra, bbls, NY . . . . lb.	. . .	.09⅛	.09⅛	.10	.09½	.13¾
Pure, bbls, NY . . . . lb.	. . .	.11¾	.11¾	.12¼	.11¾	.14¼
Oiticica, bbls . . . . lb.	.09¼	.09½	.09¼	.12¾	.10⅞	.17
Oleo, No. 1, bbls, NY . . . . lb.	. . .	.08½	.08½	.10½	.10½	.14½
No. 2, bbls, NY . . . . lb.	. . .	.08	.08	.10	.10	.14
Olive, denat, bbls, NY . . . gal.	.88	.92	.88	1.20	1.15	1.65
Edible, bbls, NY . . . . . . gal.	1.85	2.00	1.85	2.35	2.20	2.50
Foots, bbls, NY . . . . lb.	.07⅞	.08	.07⅞	.09⅞	.09⅝	.12½
Palm, Kernel, bulk . . . . . . lb.		.04⅛	.04⅛	.04½	.04½	.08⅛
Niger, cks . . . . lb.	.03⅜	.03½	.032	.04½	.04	.07¼
Sumatra, tks . . . . lb.		.03	.03	.0375	.0375	.06½
Peanut, crude, bbls, NY . . lb.	.07⅛	.07¼	.07	.07½	.06¼	.10⅝
Tks, f.o.b. mill . . . . lb.	. . .	.06⅞	.06⅝	.07½	.06½	.10¼
Refined, bbls, NY . . . . . . lb.	.09¾	.10	.09¾	.10¼	.10	.13½
Perilla, drs, NY . . . . lb.	.10	.10¼	.10	.11¾	.11	.13½
Tks, Coast . . . . lb.	. . .	.092	.098	.11	.105	.13
Pine, see Pine Oil, Chemical Section.						
Rapeseed, blown, bbls, NY lb.	.14½	.14¾	.14½	.14¾	.13	.14¾
Denatured, drs, NY . . . gal.	. . .	.80	.80	.91	.85	.97
Red, Distilled, bbls . . . . lb.	. . .	.08⅜	.08⅜	.10⅝	.09⅝	.12⅝
Tks . . . . lb.	. . .	.07½	.07½	.09¾	.08¾	.10¾
Sardine, Pac Coast, tks . . gal.	. . .	.36	.36	.46½	.35	.55
Refined alkali, drs . . . . . lb.	.087	.089	.08	.095	.08	.10
Tks . . . . lb.	. . .	.077	.074	.087	.074	.09
Light pressed, drs . . . . . . lb.	.077	.079	.074	.089	.074	.094
Tks . . . . lb.	. . .	.07	.067	.08	.067	.084
Sesame, yellow, dom . . . . . lb.	.10¼	.10½	.10¼	.10½	.10¼	.13¼
White, dom . . . . lb.	.10¼	.10½	.10¼	.10½	.10¼	.13¼
Soy Bean, crude						
Dom, tks, f.o.b. mills . . . lb.	. . .	.06	.06	.07	.06	.10½
Crude, drs, NY . . . . . . lb.	.068	.07½	.066	.08	.066	.11½
Ref'd, drs, NY . . . . lb.	.078	.092	.078	.097	.078	.12½
Tks . . . . lb.	. . .	.072	.072	.082	.072	.11½
Sperm, 38° CT, bleached, bbls						
NY . . . . lb.	.10	.102	.10	.102	.096	.102
45° CT, bleached, bbls,						
NY . . . . lb.	.093	.095	.093	.095	.089	.095
Stearic Acid, **double pressed**						
dist bgs . . . . lb.	.11	.12	.11	.12	.11	.13½
Double pressed saponified						
bgs . . . . lb.	.11¼	.12¼	.11¼	.12¼	.11¼	.13¾
Triple pressed dist bgs . . lb.	.14	.15	.14	.15	.14	.16½
Stearine, Oleo, bbls . . . . . . lb.	.05½	.06	.05½	.08	.07	.11½
Tallow City, extra loose . . . lb.	. . .	.04¾	.04¾	.06⅜	.05⅞	.09¼
Edible, tierces . . . . lb.	. . .	.06	.06	.07¼	.06⅞	.10¼
Acidless, tks, NY . . . . . . lb.	. . .	.08	.08	.09¼	.09	.13
Turkey Red, single, bbls . . lb.	.06¼	.08½	.06¼	.08½	.08	.08½
Double, bbls . . . . lb.	.09½	.11	.09½	.13	.12½	.13
Whale:						
Winter bleach, bbls, NY lb.	.098	.10	.098	.10	.091	.111
Refined, net, bbls, NY . . lb.	.094	.096	.094	.096	.087	.107

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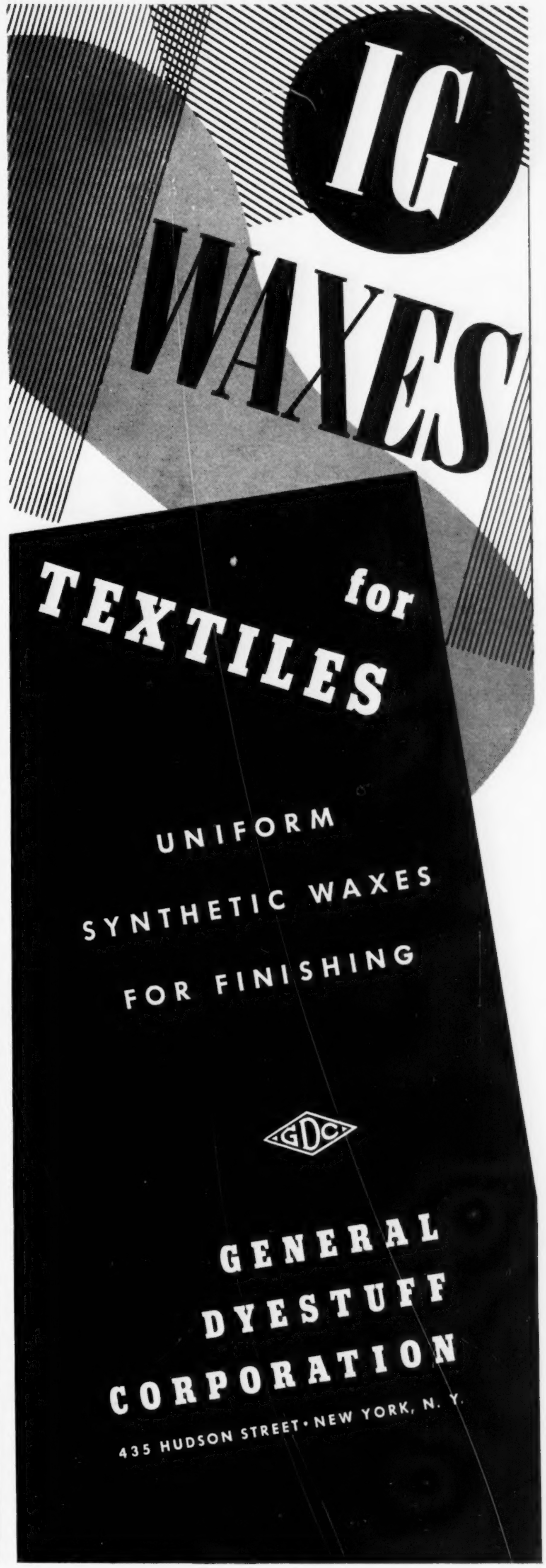


"We"—Editorially Speaking

It is worth a trip to Skytop—and what a trip it is—to hear E. H. Killheffer and Ralph McKinney exchange skiing experiences.

It was noted at Skytop that company presidents breakfast at eight, vice-presidents at eight-thirty; and sales managers at nine—and from this Warren Watson deducts that the higher the rank the longer the golf game.

Someone should be at pains to point out to distinguished visiting speakers the distinctions that exist between the membership of the M.C.A. and the A.C.S.

The forum meeting proved again that right within the industry's own ranks we have men who can talk most effectively and who can bring constructive, logical thinking to pressing current problems. Each one of the "talks" made was a very real contribution.

The tribute to Henry Howard, who attended his first M.C.A. meeting in 1879, was a sincere and spontaneous expression of high regard and true affection for the veteran of American chemical industry.

An American workman earns enough in eighteen minutes to buy a dozen eggs, according to a recent survey. It takes an English worker half an hour and a German worker two hours to earn a similar amount. The Japanese worker eats birdsnest soup.

Courtesy "The Pioneer."

Our work on the chemical synthesis of the molecule isn't entirely lost anyway—it makes perfect coffee.

Fifteen Years Ago

From our issues of June, 1923

A. E. Staley Mfg. Co., Decatur, Ill., plans plant addition to cost $50,000.

E. H. Killheffer, Newport Chemical, elected chairman, New York Section, A. A. T. C. & C.

Barium Reduction Corp., recently incorporated, will take over complete business of Rollin Chemical Corp.

American Leather Chemists' Ass'n holds 20th annual meeting at White Sulphur Springs.

R. F. Revson now New York chemical purchasing agent for H. A. Metz Co., Phila.

H. Gardner McKerrow appointed sales manager for Althouse Chemical, Reading, Pa.

Libbey-Owens Sheet Glass Co. to build plant at East Toledo to cost $5,000,000.

Pfaltz & Bauer opens Chicago office.

John Powell forms company to specialize in insect powder and imported botanical drugs.

Maybe here's an explanation by Frank Kent who in his column of political comments notes that testifying before the House Appropriation Committee the Director of the P.W.A., Harry Hopkins, four times stated that even if industry absorbs a million and a half workers this summer he would still need $1,500,000,000 for relief:

"That is an astounding statement. If a difference of 1,500,000 persons on the relief rolls makes no difference in the amount of money needed, what would make a difference? Mr. Hopkins has estimated that WPA work costs an average of $63.50 a month per person. On this basis, the absorption of 1,500,000 persons by private employment ought to mean a reduction in cost of $100,000,000 a month, or more than $1,000,000,000 a year. Yet, Mr. Hopkins says just as much money would be needed. This is the sort of thing that baffles those who try to follow New Deal reasoning and mathematics. It might suggest to even an Administration Senator, not completely under the White House anesthetic, that perhaps some control over relief expenditures is essential."

Did you know that—

In 1937 European sales of pyrites exceeded six and one half million tons—surpassing the 1929 record—and that the Spanish share fell from 51 per cent. in '29 to 37 per cent.

A famous French yellow dye was made of goat's hair dissolved in potash steeped in fermented wine.

The Roumanian Somametan Company produced 532 tons of carbon black last year.

The young Beckers who is one of the new Governors of the New York Stock Exchange is the son of our own Dr. Beckers of Beckers Aniline and now director of Allied Chemical & Dye Corporation.

"We" suffer from the vagaries of the printer's devil ourselves so we have a lively sympathy for *Oil and Soap* in their recent announcement of a "new noncrystallizing rum rosin."

It would appear that there is something after all in the good old-fashioned notion about election year being bad for business because:

In 1934, there were 2,283,000 more people on relief in November than in June. In 1936, the increase between July and November was 1,213,000 persons. But in the non-election years, in this period, the figures show a sharp decrease, as follows:

1933—A decrease of 3,243,000.
1935—A decrease of 3,165,000.
1937—A decrease of 2,648,000.

Courtesy "Hide and Leather with Shoe Factory."

Replacing pickets with pickets.

VOL. 42
June '38

CHEMICAL INDUSTRIES

Statistical and Technical Data Section

NO. 6
Part 2

State of Chemical Trade

Current Statistics (May 31, 1938)—p. 11

WEEKLY STATISTICS OF BUSINESS

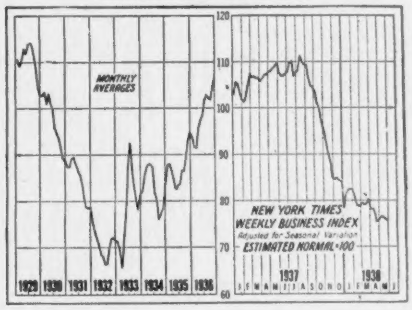
Week Ending	Carloadings 1938	Carloadings 1937	Carloadings % of Change	Electrical Output* 1938	Electrical Output* 1937	Electrical Output* % of Change	Jour. of Com. Price Index	Nat'l Fertilizer Ass'n Price Indices: Chem. & Drugs	Fats & Oils	Fert. Mat.	Mixed Fert.	All Groups	†Labor Dept. Chem. & Drug Price Index	% Steel Activity	N. Y. Times Index Bus. Act.	Fisher's Index Pur. Power
Apr. 23.....	523,767	756,248	—30.7	1,951,456	2,188,124	—10.8	77.6	94.9	60.8	72.1	76.9	74.7	77.3	32.0	75.4	123.4
Apr. 30.....	543,075	777,647	—30.2	1,938,660	2,193,779	—11.6	77.1	94.9	59.8	71.9	76.9	74.2	77.1	30.7	75.7	124.0
May 7.....	536,140	763,495	—29.8	1,939,100	2,176,363	—10.9	77.3	94.9	59.9	71.8	76.9	74.0	77.0	30.4	76.4	124.2
May 14.....	541,813	769,560	—29.6	1,967,613	2,194,620	—10.3	77.6	94.9	60.3	71.6	76.9	74.4	76.7	30.7	76.4	123.7
May 21.....	545,808	775,034	—29.6	1,967,807	2,198,646	—10.5	77.5	94.0	59.7	71.5	76.8	74.7	76.4	29.0	76.0	122.8
May 28.....	......	......	....	....	....	....	76.9	...	...	...	...	...	...	...	75.7	123.8

* K.W.H., 000 omitted; † 1926-1928 = 100.0.

MONTHLY STATISTICS

CHEMICAL:	April 1938	April 1937	March 1938	March 1937	February 1938	February 1937
Acid, sulfuric (expressed as 50° Baumé, short tons, Bureau of the Census)						
Total prod. by fert. mfrs.	....	180,040	154,379	193,979	159,659	178,979
Consumpt. in mfr. fert.	....	172,936	129,233	196,134	125,294	164.880
Stocks end of month	....	68,352	93,319	72,585	89,857	74,400
Alcohol, Industrial (Bureau Internal Revenue)						
Ethyl alcohol prod., proof gal.	12,739,423	16,824,151	18,305,610	19,873,456	16,708,492	17,571,664
Comp. denat. prod., wine gal...	297,743	255,623	130,577	260,002	153,361	486,698
Removed, wine gal.	300,348	261,524	121,517	226,422	151,155	424,528
Stocks end of mo., wine gal.	546,054	792,893	549,026	799,919	540,245	767,112
Spec. denat. prod., wine gal. ...	5,989,710	6,843,259	6,076,362	6,292,297	4,934,113	4,987,938
Removed, wine gal.	6,063,471	6,454,712	6,048,474	6,309,500	4,845,397	4,986,079
Stocks end of mo., wine gal.	581,235	864,449	663,519	479,888	638,597	501,387
Ammonia sulfate prod., tons *a*..	34,344	69,820	36,134	71,592	32,959	63,861
Benzol prod., gals. *b*	5,385,000	10,328,000	5,998,000	10,737,000	5,575,000	9,522,000
Byproduct coke, prod., tons *a* ..	2,436,264	4,348,826	2,675,071	4,494,563	2,493,586	3,991,481
Cellulose Plastic Products (Bureau of the Census)						
Nitrocellulose sheets, prod., lbs.	....	1,239,686	....	1,371,819	444,871	1,557,356
Sheets, ship., lbs.	....	1,174,223	....	1,251,331	492,087	1,301,177
Rods, prod., lbs.	....	347,078	....	334,841	185,607	347,783
Rods, ship., lbs.	....	358,330	....	309,714	183,112	317,594
Tubes, prod. lbs.	....	105,171	....	87,901	44,372	71,065
Tubes, ship., lbs.	....	95.570	....	78,329	40,859	68,696
Cellulose acetate, sheets, rods, tubes:						
Production, lbs.	....	1,410,637	....	1.621,103	337,938	1,269,775
Shipments, lbs.	....	1,313,195	....	1,764.311	288,761	1,396,509
Methanol (Bureau of the Census)						
Production, crude, gals.	....	531,727	432,800	546.662	404.970	500.685
Production, synthetic, gals.	....	2,138,895	2,343,828	2,071,747	2,290.609	1,849,302
Pyroxylin-Coated Textiles (Bureau of the Census)						
Light goods, ship., linear yds. ..	....	4,314,429	2,827,462	4,769,506	2,575,661	3,664,189
Heavy goods, ship., linear yds.	....	2,451,581	1,913,336	2,642,703	1,511,615	2,142.082
Pyroxylin spreads, lbs. *c*	....	7,155,521	4,943,100	7,803,471	4,258,768	6,498,204
Exports (Bureau of Foreign & Dom. Commerce)						
Chemicals and related prod. *d*..	$11,459	$12,385	$11,560	$12,139	$8,784	$9,954
Crude sulfur *d*	$1,130	$767	$717	$499	$1,017	$373
Coal-tar chemicals *d*	$1,025	$1,422	$1,047	$1,366	$539	$1,078
Chemical specialties *d*	$2,508	$2,521	$2,307	$2,405	$1,894	$1,997
Industrial chemicals *d*	$2,269	$2,463	$2,136	$2,596	$1,810	$1,933
Imports						
Chemicals and related prod. *d*..	$6,728	$11,020	$7,804	$10,775	$6,120	$9,739
Coal-tar chemicals *d*	$1,256	$1,742	$961	$1,438	$1,270	$1,369
Industrial chemicals *d*	$1,159	$2,676	$1,766	$2,833	$1,014	$2,265
Payrolls (U. S. Dept. of Labor, 3 year av., 1923-25 =100)						
Chemicals and allied prod., including petroleum	116.2	136.4	119.4	128.1	119.4	123.6
Other than petroleum	110.8	136.2	114.5	128.8	113.7	123.9
Chemicals	117.0	150.6	117.6	140.2	123.1	135.2
Explosives	86.5	107.6	90.9	97.5	92.4	93.0
Employment (U. S. Dept. of Labor, 3 year av., 1923-25 =100)						
Chemicals and allied prod., including petroleum	110.0	126.6	113.0	124.9	113.1	121.9
Other than petroleum	108.2	127.7	111.8	126.0	111.9	122.4
Chemicals	108.4	135.6	110.5	134.0	115.5	131.4
Explosives	86.0	92.4	87.2	90.2	87.4	93.2
Stocks of chemicals, etc.:**						
Finished	....	148	188	154	189	153
Raw material	....	75	100	78	110	84
Price index chemicals	....	94.2	83.2	95.3	83.6	95.6
Chem. and drugs	....	86.9	78.7	87.5	79.1	87.8
Fert. mat.	....	70.7	71.8	70.3	72.3	70.7
Mixed fert.	....	72.0	71.6	71.7	72.3	71.7

Industrial Trends



Business: While the rate of manufacturing activity failed to show any definite improvement, reports from various groups indicate that a modest amount of ordering was done last month, indicating that finally stocks are at such a low point that replacement is necessary. May business just about held to the April level in face of the usual seasonal decline. There is a growing sentiment that business is now "scraping the bottom."

Steel: Activity dipped under the 30% level in the final week of the month, comparing very unfavorably with the 78% rate in the same period of last year. Steel men are very pessimistic over the immediate outlook and expect further losses during the summer period. Even a sharp increase in buying early in the fall by the automotive companies is now doubted. Additional confusion was added when former NRA administrator, Hugh S. Johnson, suggested that the steel companies lower prices to get the "ball rolling again."

Automobiles: May output just about reached 195,000 units, compared with 238,133 in April and 540,377 in May, '37. June output is expected to total about 155,000. A very dull summer period is anticipated. While companies may not shut down for long periods because of the effect such action might have on general sentiment, they will operate on greatly curtailed operating schedules.

Inventories: Available statistics indicate that greater progress in the liquidation of inventories is being made currently than in the recession after '29.

State of Chemical Trade
Current Statistics (May 31, 1938)—p. 11

State of Chemical Trade

Current Statistics (May 31, 1938)—p. 12

Retail Trade: Failure of retail volume to improve during the past month, and less impressive showings by stores in districts hitherto immune to the recession, make retailers increasingly pessimistic over the outlook. What buying there is is of the strictly "hand-to-mouth" variety, and stocks in retail hands are said to be at the lowest point in years. The wet, cool weather of the past few weeks has provided an additional set-back on seasonal items.

Rubber: Labor troubles still are an unsettling influence in the Akron area. Tire production continues to show month-to-month decline with little to indicate that a turn for the better is in the immediate offing.

Construction: April figures were not encouraging. Some improvement is expected, however, in the next few months, largely though on the belief that public construction figures will soar when the latest "pump-priming" really gets under way.

Employment:. A slight rise of 70,000 in employment was noted in April, but the normal total for the month is around 400,000. Some 3 million are said to have lost jobs since last autumn, when the present recession started to become acute.

Carloadings: A dip of 16.2% is expected in the total for the second quarter as compared with the corresponding period of last year. Only a 4% drop is expected in the figure for chemicals and explosives, as compared with 36% for automobiles.

Outlook: General consensus of opinion at the recent meeting of the National Association of Purchasing Agents was that a continuation of a buying policy limiting commitments to current needs was advisable. On the other hand, there was plenty of sentiment that the bottom was here.

It now appears that the President is to have his way on the spending of some $5,000,000,000 in another effort to "prime the pump." Business leaders are still in a pessimistic frame of mind. The political situation becomes more unsettled, and it becomes increasingly evident that executives are deferring decisions until the fall elections are out of the way and the returns are in. There is little reason to believe now that the summer period will not be one of the dullest on record. The one ray of hope is the inventory situation, and this may hold the answer to an earlier upturn than now appears possible. Wholesale commodity prices slumped badly again last month, but even a modest wave of buying could probably change the direction in very short order.

MONTHLY STATISTICS (cont'd)

FERTILIZER:	April 1938	April 1937	March 1938	March 1937	February 1938	February 1937
Exports (short tons, Nat. Fert. Association)						
Fertilizer and fert. materials	....	137,607	172,296	106,297	122,456	66,401
Ammonium sulfate	....	12,359	686	519	78	304
Total phosphate rock	....	102,562	131,830	73,977	104,251	42,348
Total potash fertilizers	....	9,712	7,031	3,199	8,134	2,818
Imports (short tons, Nat. Fert. Association)						
Fertilizer and fert. materials	....	283,366	189,265	253,806	159,506	261,193
Ammonium sulfate	....	7,456	10,204	5,630	10,883	18,165
Sodium nitrate	....	153,449	91,426	97,979	68,755	118,396
Total potash fertilizer	....	36,905	22,322	55,193	22,534	37,351
Superphosphate e (Nat. Fert. Association)						
Production, bulk	220,166	307,834	257,595	371,164	251,999	317,015
Shipments, total	756,121	849,386	664,739	768,666	278,511	309,763
Northern area	350,467	350,017	235,742	224,558	98,542	85,329
Southern area	405,654	499,369	428,997	544,108	179,969	224,434
Stocks, end of month, total	1,179,223	960,552	....	....	2,030,579	1,798,950
Tag Sales (short tons, Nat. Fert. Association)						
Total, 17 states	1,108,005	1,399,151	1,592,939	1,872,296	759,813	806,002
Total, 12 southern	1,039,765	1,329,605	1,521,234	1,753,416	693,855	764,356
Total, 5 midwest	68,240	69,546	71,705	118,880	65,958	41,646
Fertilizer payrolls	119.1	150.9	110.7	127.6	86.8	86.9
Fertilizer employment	121.5	151.6	116.7	135.9	93.3	96.1
Value imports, fert. and mat. *d*	$3,580	$5,473	$4,261	$5,587	$3,206	$5,097
Value exports, fert. and mat. *d*	$1,520	$1,356	$1,670	$1,194	$1,087	$789
GENERAL:						
Acceptances outst'd'g *f*	$278	$395	$292	$396	$307	$401
Coal prod., anthracite, tons	3,108,000	6,854,000	4,015,000	4,235,094	3,056,728	3,042,496
Coal prod., bituminous, tons	22,195,000	26,041,000	26,745,000	....	27,000,000	42,110,000
Com. paper outst'd'g *f*	$271	$285	$296	$290	$293	$268
Failures, Dun & Bradstreet	1,116	786	1,088	820	1,071	721
Factory payrolls *i*	70.5	104.9	73.3	101.1	73.2	95.8
Factory employment *i*	79.6	102.1	81.7	101.1	82.2	99.0
Merchandise imports *i*	$155,501	$280,899	$173,405	$307,474	$163,085	$277,709
Merchandise exports *i*	$274,482	$268,945	$275,711	$256,565	$262,733	$233,125
GENERAL MANUFACTURING:						
Automotive production	219,314	536,150	221,951	494,121	186,806	364,193
Boot and shoe prod., pairs	....	....	36,762,947	45,803,218	29,767,420	39,577,566
Bldg. contracts, Dodge *j*	$222,016	$270,125	$226,918	$231,246	$119,038	$118,945
Newsprint prod., U. S., tons	58,836	78,642	67,864	82,576	61,357	72,072
Newsprint prod., Canada, tons	200,794	298,347	224,604	301,110	202,601	275,532
Plate glass prod., sq. ft.	....	....	3,802,112	20,742,575	2,663,838	....
Steel ingot prod., tons	1,925,166	5,070,867	2,011,840	5,216,243	1,703,245	4,413,832
% steel capacity	33.44	90.25	33.84	89.90	31.73	84.25
Pig iron prod., tons	1,376,141	3,391,665	1,452,487	3,459,473	1,298,268	2,992,218
U. S. consumpt. crude rub., tons	27,984	51,589	30,487	54,064	23,868	51,887
Cotton consumpt., bales	414,392	718,975	510,941	776,942	427,528	665,677
Cotton spindles oper.	21,786,054	24,727,106	22,288,098	24,640,046	22,356,638	24,517,706
Silk deliveries, bales	33,381	40,561	34,884	39,934	30,260	58,484
Rayon ship., index *p*	444	702	455	693	493	721
Rayon employment *i*	302.4	378.1	334.3	373.3	329.2	370.4
Rayon payrolls *i*	259.3	364.8	300.4	349.7	283.4	344.5
Soap employment *i*	93.8	107.6	96.0	111.0	96.3	109.8
Soap payrolls *i*	108.5	116.4	111.8	123.2	111.2	124.5
Paper and pulp employment *i*	106.8	119.1	108.1	117.6	108.7	116.1
Paper and pulp payrolls *i*	99.6	119.6	103.4	116.5	103.2	113.5
Leather employment	74.5	100.0	76.4	98.8	77.6	97.5
Leather payrolls *i*	74.6	111.4	78.2	107.3	80.2	104.6
Glass employment *i*	81.3	110.9	83.7	110.1	85.4	107.6
Glass payrolls *i*	77.0	120.2	80.8	115.1	79.1	107.2
Rubber prod. employment *i*	72.7	96.7	72.9	96.7	74.3	101.6
Rubber prod. payrolls *i*	61.5	100.3	60.6	99.8	58.9	104.4
Dyeing and fin. employment *i*	103.4	123.1	104.9	123.1	104.8	122.8
Dyeing and fin. payrolls *i*	85.9	114.6	89.0	112.6	89.5	111.9
MISCELLANEOUS:						
Oils and fats, price index	....	....	....	130.2	89.7	129.3
Price index K, rosin	....	....	....	152.7	90.8	164.1
Gasoline prod., bbls.	....	....	45,352	45,141	41,762	....
Cottonseed oil consumpt., bbls.	231,975	207,405	....	....	428,531	....
Price index, turpentine	....	....	....	75.3	50.7	81.2
PAINT, VARNISH, LACQUER, FILLERS:						
Sales 680 establishments	....	$46,345,474	$30,728,890	$39,498,071	$22,625,906	$31,015,653
Trade sales (580 establishments)	....	$25,102,366	$17,227,950	$19,398,445	$12,535,636	$15,440,210
Industrial sales, total	....	$16,759,108	$10,417,161	$16,601,194	$7,942,419	$12,885,413

a Bureau of Mines; *b* Crude and refined plus motor benzol, Bureau of Mines; *c* Based on 1 lb. of gun cotton to 7 lbs. of solvent, making an 8-lb. jelly; *d* 000 omitted, Bureau of Foreign & Domestic Commerce; *e* Expressed in equivalent tons of 16% A.P.A.; *f* 000,000 omitted at end of the month; *i* U. S. Dept. of Labor, 3 year average, 1923-25 = 100; *j* 000 omitted, 37 states; *p* Rayon Organon, 1923-25 = 100; *q* 680 establishments, Bureau of the Census; *r* Classified sales, 580 establishments, Bureau of the Census; *s* 53 manufacturers, Bureau of the Census; *v* In thousands of bbls., Bureau of the Census; ** Indices, Survey of Current Business, U. S. Dept. of Commerce.

Price Trend of Representative Chemical Company Stocks

	Apr. 30	May 6	May 13	May 20	May 28	May 31	Net Gain or loss last mo.	Price on May 31, 1937	1938 High	1938 Low
Air Reduction	42	44¼	46	45½	41½	43	+ 1	74	58¼	40
Allied Chemical	...	142½	149	147	137	137½	......	231½	176½	124
Amer. Cyanamid ...	17¼	17¾	18¼	17⅝	16¼	15¾	— 1½	29	26⅝	15½
Amer. Agric. Chem.	...	56	60	...	50⅛	...	......	87	66	49
Columbian Carbon ..	66¼	61	68½	68	65	66½	+ ¼	117	76	53¾
Commercial Solvents.	6¾	7	6⅞	7	6⅛	6⅛	— ⅝	15⅜	10	5⅞
Dow Chemical	100¼	102¼	105	104	94	93½	— 6¾	...	112	87⅞
Du Pont	96⅞	100¼	101	99¼	92¾	92½	— 4⅜	154	123⅜	90½
Hercules Powder ...	44	44½	49½	46	43¼	...	......	155	58	42¾
Mathieson Alkali ...	22⅛	23	21¼	22	21¼	21½	— ⅝	37	37¼	25
Monsanto Chemical..	...	70⅞	74¾	74	69½	70	......	85½	91½	67
Std. of N. J.	45⅜	47¾	48½	46¼	43¾	44⅜	— 1	...	54⅛	39¾
Texas Gulf Sulphur.	...	29¼	31	30¾	29½	28½	......	36¾	34	26
Union Carbide	63	65	66¼	66¼	59½	60⅝	— 2⅜	99	80	57
U. S. Ind. Alcohol..	16¼	17⅛	18⅛	17⅞	15⅛	15¼	— 1	35	23¾	13½

Earnings Statements Summarized

Company:	Annual dividends	Net income 1938	Net income 1937	Common share earnings 1938	Common share earnings 1937	Surplus after dividends 1938	Surplus after dividends 1937
Abbott Laboratories:							
Twelve months, Mar. 31	§$1.60	$1,590,407	$1,510,379	$2.44	$2.36	......	......
American Commercial Alcohol Corp.:							
March 31 quarter	§.50	59,144	212,645	.12	.76	......	......
American I. G.:							
Year, Mar. 31	*a*5.00	4,186,110	4,684,769	*a*5.26	*a*5.89	......	......
Archer-Daniels-Midland:							
††March 31 quarter ...	*y*2.00	197,669	686,655	.27	1.15	......	......
Nine months, March 31	*y*2.00	873,786	1,850,541	1.31	3.97	......	......
Celanese Corp. of America:							
March 31 quarter	*e*1.50	114,274	1,748,828	*r*.69	1.08	......	......
Twelve months, Mar. 31	*e*1.50	2,826,648	......	.57	....	......	......
Compressed Industrial Gases:							
March 31 quarter	*f*....	8,146	143,796	*h*.03	*h*.91	......	......
Continental-Diamond Fibre:							
March 31 quarter	*f*....	†238,754	181,188	....	.40	......	......
Formica Insulation:							
March 31 quarter	*e*.60	†11,965	41,178	....	.23	......	......
General Printing Ink:							
March 31 quarter	*y*1.00	170,164	327,235	.16	.37	......	......
Glidden:							
Six months, April 30 ..	*f*....	‡12,571	1,683,254	....	1.82	......	......
Interchemical:							
March 31 quarter	*e*1.50	11,795	405,086	*p*.18	1.05	......	......
Twelve months, Mar. 31	*e*1.50	443,967	1,461,399	.15	3.67	......	......
International Nickel Co. of Can.:							
March 31 quarter	*y*2.25	10,113,765	11,714,957	.66	.77	$2,341,207	$3,942,398
Koppers:							
Twelve months, Mar. 31	....	3,022,016	......	18.22	....	......	......
New Jersey Zinc:							
March 31 quarter	*y*3.50	652,596	2,169,841	.33	1.10	*d*329,036	1,188,209
Newport Industries:							
March 31 quarter	*e*1.50	38,506	400,560	.07	.77	......	......
Twelve months, Mar. 31	*e*1.50	813,329	814,331	1.56	1.57	......	......
United Carbon:							
March 31 quarter	*y*4.50	438,364	722,368	1.10	1.81	......	......
Standard Oil of Calif.:							
March 31 quarter	§1.00	7,130,486	7,889,489	.55	.60	......	......
		1937	**1936**	**1937**	**1936**	**1937**	**1936**
Standard Oil Co. of N. J.:							
Year, Dec. 31	*k*2.50	147,993,147	97,774,583	5.64	3.73	82,443,532	45,352,900

§ Plus extras; *a* On Class A shares; †† Indicated quarterly earnings as shown by comparison of company's reports for the 6 and 9 months periods; *y* Amount paid or payable in 12 months to and including the payable date of the most recent dividend announcement; *c* Paid in last 12 months; *r* On first preferred stock; *f* No common dividend; *p* On preferred stock; *d* Deficit; *k* Paid in year 1937.

Earnings Statements

Texas Gulf Sulphur reports for 3 months ended Mar. 31, '38, net earnings of $1,839,687, after charges for depreciation, amortization, contingencies and federal income taxes, equivalent to 48c per share on 3,840,000 shares outstanding. This compares with net earnings of $2,100,050, or 55c per share on the same number of shares, for the corresponding period last year.

Report of Interchemical Corp. (formerly International Printing Ink) and wholly owned subsidiaries for quarter ended Mar. 31, '38, shows net profit of $11,795 after depreciation, federal income taxes, etc., but before surtax on undistributed profits, equivalent to 18c a share on 66,627 shares of 6% preferred stock outstanding at close of period.

This compares with net profit of $405,086 equal to $1.05 a share on 288,358 no-par shares of common stock in March quarter of previous year, after dividend requirements on 6% preferred stock.

For 12 months ended Mar. 31, '38, net profit was $443,967 after charges and federal income taxes, equal after allowing for 12 months dividend requirements on 66,627 shares of 6% preferred stock outstanding at close of period, to 15c a share on 289,618 common shares.

This compares with $1,461,399 or $3.67 a share on 288,358 common shares in 12 months ended Mar. 31, '37.

Dividends and Dates

Name	*Div.*	*Stock Record*	*Payable*
Abbott Labs., q ..	40c	June 15	June 30
Abbott Labs., pf., q	$1.12½	July 1	July 15
Alum. Co. of Am., pf., q	$1.50	June 15	July 1
Am. Smelt. & Ref.	50c	May 6	May 31
Archer-Daniels-Midland	25c	May 21	June 1
Atlantic Ref'g, q.	25c	May 20	June 15
Atlas Powder ...	50c	May 31	June 10
Chickasha Cotton Oil, sp.	25c	May 25	June 15
Clorox Chem., q..	75c	June 15	June 25
Cook Paint & Varnish, q	15c	May 20	June 1
Cook Paint & Varnish, pf., q.	$1.00	May 20	June 1
Colgate-Palmolive-Peet	action deferred Jan 26, '38		
Colgate-Palmolive-Peet, pf., q ...	$1.50	June 6	July 1
Columbian Carbon, q	$1.00	May 20	June 10
Commerc'l Solvents	no action May 25, '38		
Compressed Ind. Gases	no action May 4, '38		
duPont, I	50c	May 23	June 14
duPont, $4.50 pf., q	$1.12½	July 8	July 25
duPont, deb., q ..	$1.50	July 8	July 25
Eagle Picher Lead	no action May 26, '38		
Eagle Picher Lead, pf., q	$1.50	June 15	July 1
Freeport Sulphur, q	50c	May 12	June 1
Glidden Co., pf., q	56¼c	June 16	July 1
Glidden Co.	no action Mar. 7, '38		
Hercules Pwdr., q	25c	June 14	June 25
Heyden Chem. Corp., I	30c	May 25	June 1
Imperial Chem. Ind., F	5½%	Apr. 21	June 8
Interchemical Corp.	action deferred Jan. 15, '38		
Int'l Agr. Chem., pf.	$2.00	June 10	June 20
Int'l Nickel of Can.	50c	May 31	June 30
Int'l Salt, q	37½c	June 15	July 1
Lindsay Lt. & Chem., pf., q ..	17½c	June 4	June 20
Mathieson Alk., q	37½c	June 8	June 30
Mathieson Alk., pf., q	$1.75	June 8	June 30
McKesson & Rob., pf., q	75c	May 31	June 15
Merck & Co.	no action Mar 17, '38		
Monsanto Chem., q	50c	June 1	June 15
Monsanto Chem., pf. s	$2.25	Nov. 10	Dec. 1
Monsanto Chem., pf. A s	$2.25	May 10	June 1
Nat'l Lead	12½c	June 17	June 30
Nat'l Lead, pf. A, q	$1.75	May 27	June 15
Nat'l Lead, pf. B, q	$1.50	July 22	Aug. 1
Nat'l Oil Prods...	20c	June 20	June 30
N. J. Zinc	50c	May 20	June 10
Patterson-Sargent, q	25c	May 16	June 1
Penick & Ford ..	75c	June 1	June 15
Penn. Salt Mfg...	$1.00	May 31	June 15
Pittsburgh Plate Glass	25c	June 10	July 1
Procter & Gamble, 5% pf., q	$1.25	May 25	June 15
St. Joseph Lead..	25c	June 10	June 20
Sherwin-Williams of Can., pf. ac. .	$1.75	June 15	July 2
Sherwin-Williams, pf., q	$1.25	May 14	June 1
Spencer Kellogg, q	40c	May 25	June 10
Staley Mfg., $5 pf., q	$1.25	June 10	June 20
Staley Mfg., 7% pf., s	$3.50	June 20	July 1
Sterling Prods., q	95c	May 16	June 1
Swan-Finch Oil, pf., q	37½c	May 18	June 1
Texas Gulf Sulphur, q	50c	June 1	June 15
Union Carbide & Carbon	40c	June 3	July 1
United Carbon ..	75c	June 15	July 1
United Dyewood..	no action Feb. 15, '38		
United Dyewood, pf., q	$1.75	June 10	July 1
Westvaco Chlorine Prods., q	25c	May 10	June 1

ac.—accumulation.
s.—semi annual.
sp.—special.

Chemical Finances May 1938—p. 11

Chemical Finances
May 1938—p. 12

Chemical Stocks and Bonds

NEW YORK STOCK EXCHANGE

Price Range May Last	1938 High	1938 Low	1937 High	1937 Low	1936 High	1936 Low	Sales (Number of shares) May 1938	Sales 1938	Stocks	Par $	Shares Listed	Dividends*	Earnings** $-per share-$ 1937	1936	1935
43	45	36¼	55	36	...	...	600	6,200	Abbott Labs.	No	640,000	$2.10	2.51	2.21	1.77
43	58¼	40	80¼	44½	86½	58	26,900	147,500	Air Reduction	No	2,566,191	3.00	2.86	2.79	2.05
137½	176½	124	258½	145	345	157	12,000	81,900	Allied Chem. & Dye	No	2,214,099	7.50	11.19	11.44	8.71
50⅛	66	49	101½	53½	89	49	2,000	9,700	Amer. Agric. Chem.	No	210,932	7.75	8.86	4.71	6.37
9	13¾	9	30¾	8¼	35⅜	20½	3,200	31,900	Amer. Com. Alcohol	20	260,930	.50	3.23	4.55	3.16
21¾	30¼	20	46	22	50	37	1,800	8,700	Archer-Dan.-Midland	No	549,546	2.00	5.03	3.05	4.20
37	48	36	94	38	84	48	4,200	13,400	Atlas Powder Co.	No	248,145	2.25	4.40	4.21	2.81
115	119	105	133	101	131	112	470	1,350	5% conv. cum. pfd.	100	68,597	5.00	20.90	20.85	16.93
10¾	18⅞	9	41¼	13	32¼	21¾	14,400	140,000	Celanese Corp. Amer.	No	1,000,000	2.25	2.04	2.33	1.99
94	94	92	115	90	116	106	......	200	prior pfd.	100	164,818	7.00	27.07	27.25	35.34
7⅝	11⅞	7⅛	25¾	8½	21¼	13	11,000	129.900	Colgate-Palm.-Peet	No	1,999,970	.50	—.35	1.40	1.36
78	95½	78	104½	95	106½	100	600	6,000	6% pfd.	100	248,197	6.00	3.21	17.13	16.79
66½	76	53¾	125¾	65	136½	94	2,400	23,600	Columbian Carbon	No	537,406	6.50	8.31	7.48	5.56
6⅛	10	5⅞	21¼	5	24⅝	14¼	34,200	204,700	Commercial Solvents	No	2,636,878	.60	.60	.85	1.02
61	65½	53	71¼	50½	82½	63⅝	9,200	76,600	Corn Products	25	2,530,000	3.00	2.52	3.86	2.62
164	166½	162	171½	153	170	158	700	2,600	7% cum. pfd.	100	245,738	7.00	32.96	46.76	33.97
27⅞	39¼	25	76⅛	29½	63	42	1,150	6,860	Devoe & Rayn. A	No	95,000	3.25	4.05	4.49	2.89
93½	112	87⅞	159¼	79½	142¼	94⅛	7,200	34,600	Dow Chemical	No	945,000	3.35	4.17	4.48	3.29
92½	123⅞	90½	180⅛	98	184¾	133	62,800	352,500	DuPont de Nemours	20	11,041,437	6.25	7.37	7.54	5.04
114	115¼	109½	112	107½	...	...	3,000	13,500	4½% pfd.	No	500,000	4.50	165.48	......	......
135	137	130¾	135½	130	136½	129	900	6,700	6% cum. deb.	100	1,092,948	6.00	81.70	84.21	56.81
144¼	167	121½	198	144	185	156	10,400	67,500	Eastman Kodak	No	2,250,921	7.50	9.76	8.23	6.90
165	171	157	164	150	166	152	170	1,020	6% cum.	100	61,657	6.00	362.45	306.64	258.09
24	28	19⅞	32¼	18	35⅝	23½	11,300	93,600	Freeport Texas	10	796,380	1.50	3.30	2.43	1.78
7	9⅞	6¾	19	8½	18	9½	2,000	33,700	Gen. Printing Ink	1	735,960	1.20	1.32	1.32	.97
14½	27¼	13	51½	19⅛	55¼	39½	10,800	71,600	Glidden Co.	No	799,701	2.60	2.62	3.29	2.74
42	51½	37	58⅛	43	56	52¼	300	3,300	4½% cum. pfd.	50	199,940	2.25	12.72	15.43	13.23
77	95	79	117½	80⅛	133	99⅝	1,000	6,000	Hazel Atlas	25	434,474	6.56	6.67	6.55	7.58
43¼	58	42¾	92½	50	75	42	5,600	50,000	Hercules Powder	No	1,316,710	2.62	2.97	3.24	2.12
127¼	131½	126¾	135½	125	135	126	260	1,070	6% cum. pfd.	100	96,194	6.00	50.75	48.97	36.30
14⅝	22	14⅜	47½	15	41⅜	25⅝	10,500	76,800	Industrial Rayon	No	759,325	2.00	.34	2.24	1.00
17½	25	15	64¼	20	48	37	3,900	26,700	Interchem.	No	289,058	2.00	1.44	3.02	2.21
82¼	98	82	111½	92	112	107	240	1,130	6% pfd.	100	66,917	6.00	12.26	18.97	16.15
2	3⅞	2	9⅛	2	5⅞	2⅞	3,500	50,200	Intern. Agricul.	No	438,048	....	.16	—1.55	—.99
20	29	15	63½	18¼	47¼	22¾	2,700	14,600	7% cum. pr. pfd.	100	100,000	3.00	7.70	.23	2.69
41¼	52¾	36⅞	73⅜	37	66⅜	43¼	144,900	1,065,300	Intern. Nickel	No	14,584,025	2.25	3.31	2.40	1.65
22	24	19½	28¾	19½	30	23	500	6,100	Intern. Salt	No	240,000	1.75	2.17	1.70	1.32
22	24	19¾	36	19¼	36¾	29¼	200	2,600	Kellogg (Spencer)	No	500,000	1.60	2.81	2.62	2.22
25⅛	42	23¼	79	33⅝	80¼	47¼	18,300	118,500	Libbey Owens Ford	No	2,506,117	4.00	4.19	4.14	3.26
14¼	20	12⅛	26⅞	14	46½	32½	6,100	34,300	Liquid Carbonic	No	700,000	2.75	2.37	1.58	1.29
21½	27½	19¾	41¾	22	42⅜	27½	2,400	25,700	Mathieson Alkali	No	828,191	1.65	1.81	1.76	1.44
70	91½	67	107½	71	103	79	14,700	77,200	Monsanto Chem.	No	1,114,388	3.00	4.40	4.01	3.45
114⅛	114⅛	111	109	105	...	...	......	400	4½% pfd.	No	50,000	4.50	99.98	......	......
18	29¾	17⅛	44	18	36½	26¾	21,700	182,700	National Lead	10	3,098,310	.50	.95	1.71	1.08
156	159	150	171	153	171	155	200	1,400	7% cum. "A" pfd.	100	243,676	7.00	22.86	33.83	25.40
132⅝	136	130¾	150	127	147	137¾	110	1,050	6% cum. "B" pfd.	100	103,277	6.00	43.77	74.50	49.05
10¾	19¼	9⅞	41¾	10⅛	40	9	41,100	350,900	Newport Industries	1	519,347	.50	2.22	.98	.57
47⅝	66½	40	103¾	51¼	82	64	12,100	123,700	Owens-Illinois Glass	12.50	2,661,204	4.00	3.51	3.80	2.09
47	50⅝	39½	65½	43¼	56	40¼	11,100	83,100	Procter & Gamble	No	6,325,087	2.75	4.08	2.39	2.23
119⅛	122¼	117	118½	114½	122½	115¾	330	4,020	5% pfd.	100	169,517	5.00	157.05	94.14	88.15
11½	18¼	10	34¾	14⅞	28¼	14¾	11,300	92,300	Shell Union Oil	No	13,070,625	1.00	1.44	1.35	.37
99½	101¾	93	105⅜	91	127½	102	1,500	10,800	5½% cum. pfd.	100	379,798	5.00	60.59	57.20	17.92
19½	34¾	18½	60⅝	26½	47⅜	19½	10,500	58,800	Skelly Oil	No	1,006,348	1.50	6.07	4.42	2.17
89	93	84	102¼	88	132	97⅝	100	2,100	6% cum. pfd.	100	66,300	6.00	97.86	73.16	39.00
27½	35½	24¾	50	26½	48½	32¾	23,800	201,500	S. O. Indiana	25	15,235,323	2.30	3.06	3.09	1.98
44⅜	54⅛	39¾	76	42	70⅜	51⅛	70,900	505,100	S. O. New Jersey	25	26,224,767	2.50	5.64	3.73	2.39
5	8	3⅞	15⅜	5¼	13	5⅝	10,200	65,700	Tenn. Corp.	5	853,696	.35	1.09	.41	.22
34¼	44⅞	32⅝	65⅛	34¾	55¼	28⅞	8,000	474,000	Texas Corp.	25	11,386,253	2.25	5.02	4.10	1.57
28½	34	26	44	23¾	44¾	33	11,300	178,400	Texas Gulf Sulphur	No	3,840,000	2.75	3.02	2.57	1.94
60⅝	80	57	111	61¼	105¼	71⅝	65,700	392,000	Union Carbide & Carbon	No	9,000,743	3.20	4.75	4.09	3.06
43	49⅝	39	91	36¾	96¾	68	3,800	34,100	United Carbon	No	397,885	4.50	5.30	5.54	4.71
15¼	23¾	13½	43⅝	16⅛	59	31¼	5,800	54,400	U. S. Indus. Alcohol	No	391,238	....	1.24	—.20	2.16
12¾	20⅜	11½	39⅜	9¼	30⅝	16¼	12,000	130,300	Vanadium Corp. Amer.	No	376,637	1.00	2.22	.40	—1.13
...	...	...	...	...	...	...	3,700	4,200	Victor Chem.	5	696,000	1.12	1.01	1.16	1.13
2⅞	5⅝	2¾	12¾	2⅜	8½	4⅛	4,900	95,500	Virginia-Caro. Chem.	No	486,708	....	—.05	—2.44	—.79
19	32⅛	15¾	74⅜	18½	58¾	28¾	5,300	65,900	6% cum. part. pfd.	100	213,392	1.50	5.88	.44	4.20
11⅞	15½	10	27¼	10¾	32	19¾	500	10,400	Westvaco Chlorine	No	339,362	1.00	1.46	1.17	1.37
24½	27	20	34⅞	21⅛	35¼	31¾	900	10,500	cum. pfd.	30	192,000	1.50	4.09	3.26	3.22

NEW YORK CURB EXCHANGE

May Last	1938 High	1938 Low	1937 High	1937 Low	1936 High	1936 Low	Sales May 1938	Sales 1938	Stocks	Par $	Shares Listed	Dividends*	1937	1936	1935
15¾	26⅝	15½	37	17⅝	40¾	29¼	26,100	177,700	Amer. Cyanamid "B"	10	2,520,368	.60	2.09	1.77	1.61
60	82	59	124	69	116¼	99¼	200	1,325	Celanese, 7% cum. 1st pfd.	100	148,179	7.00	22.32	24.47	21.96
3	4½	3	15	3	16½	9	100	4,300	Celluloid Corp.	15	194,952	....	—.92	—.80	—.95
12	12	12	14⅝	10½	15	11⅞	......	100	Courtaulds' Ltd.	£1	24,000,000	9½%	8.64%	8.30%	7.51%
6¼	9⅞	6	10⅝	3½	10¾	5	800	9,700	Duval Texas Sulphur	No	500,000	....	.43	.61	.16
32¼	37½	27	47½	31	55	39	100	2,300	Heyden Chem. Corp.	100	150,000	2.50	3.94	3.56	3.22
65	90	55	147½	77	140	98¼	6,000	40,900	Pittsburgh Plate Glass	25	2,142,443	6.50	8.53	7.15	5.32
70	95	66	154¾	72¼	154½	117	5,000	30,200	Sherwin Williams	25	633,927	6.00	8.44	8.04	6.19
109¾	111½	107	114	106¼	116	110	370	1,020	5% cum. pfd.	100	137,139	5.00	44.01	41.44	33.17

PHILADELPHIA STOCK EXCHANGE

May Last	1938 High	1938 Low	1937 High	1937 Low	1936 High	1936 Low	Sales May 1938	Sales 1938	Stocks	Par $	Shares Listed	Dividends*	1937	1936	1935
121½	149½	121½	179	115	179	114¾	150	1,950	Pennsylvania Salt	50	150,000	8.75	11.79	8.57	5.94

NEW YORK STOCK EXCHANGE

Price Range May Last	1938 High	1938 Low	1937 High	1937 Low	1936 High	1936 Low	Sales May 1938	Sales 1938	Bonds	Date Due	Int. %	Int. Period	Outstanding $
103¾	104⅞	99⅛	109½	99	117½	107¾	260,000	1,216,000	Amer. I. G. Chem. Conv.	1949	5½	M-N	$25,300,000
28	31	25⅛	42½	23	42½	27½	90,000	999,000	Anglo Chilean Nitrate inc. deb.	1967	4½-5	I	12,067,000
104	105	102¾	102⅞	100⅛	...	...	61,000	231,000	Dow Chemical	1951	3	J-D	5,000,000
101	101	100	102	98½	102¾	96¾	22,000	123,000	Int. Agric. Corp. 1st Coll. tr. stpd. to 1942	1942	5	M-N	5,633,000
28½	32⅝	24¾	35⅜	21¼	39	21	172,000	881,000	Lautaro Nitrate n inc. deb.	1975	4	J-D	30,500,000
23	23	20½	25½	20½	35	23½	......	21,000	Ruhr Chem.	1948	6	A-D	1,500,000
101¾	103¾	96½	102	93	101¼	94¼	525,000	2,582,000	Shell Union Oil	1951	3½	M-S	58,800,000
100	100½	90¼	102¾	94	102⅞	96⅝	347,000	939,000	Skelly Oil	1951	4	J-J	9,000,000
100	100	95	105	93½	105	103	12,000	96,000	Tenn. Corp. deb. "B"	1944	6	M-S	1,600,000
105⅝	106½	103½	105¾	100	106	101½	217,000	1,790,000	Texas Corp.	1951	3½	J-D	60,000,000
84½	88	77	111	81	98½	85¾	23,000	218,000	Vanadium Corp. conv.	1941	5	A-O	2,800,000

* Paid in 1937, including extras but excluding dividends paid in stock. ** For either fiscal or calendar years.

Liquefied Petroleum Gases, 1937

Production and Sales—p. 1

Marketed Production of Liquefied Petroleum Gases, 1922-37

Year	Thousands of Gallons	Year	Thousands of Gallons
1922	222	1930	18,017
1923	276	1931	28,502
1924	376	1932	34,115
1925	403	1933	38,931
1926	465	1934	56,427
1927	1,091	1935	76,855
1928	4,522	1936	106,652
1929	9,930	1937	141,505

The marketed production of liquefied petroleum gases totaled 141,505,000 gals. in '37, according to a tabulation made from distributors' reports submitted to the Bureau of Mines, Dept. of the Interior. The 1937 volume of sales continued to show the sharp upward trend in the demand for liquefied petroleum gases in evidence in recent years and represents a gain of 33% over the '36 total of 106,652,000 gals. Relative gains in all major uses of liquefied petroleum gases are indicated. The 1937 totals for both domestic or "bottled gas" use and internal-combustion-engine fuel increased about 36% over the 1936 requirements. The quantity of liquefied gases sold in 1937 for industrial fuel and chemical manufacturing is about 28% above the 1936 record, while the total delivered for gas manufacturing purposes is 20% higher than the 1936 demand. Exports of liquefied petroleum gases to foreign countries in 1937 were reported as only 1,879,000 gals., compared with 4,897,000 in 1936. Added exports and domestic demand gives total deliveries of 143,384,000 gals. in 1937, a gain of 29% over the 1936 total of 111,549,000 gals. Domestic sales of propane, butane, propane-butane mixtures and pentane for the years 1932-1937 are shown in table 1. The figures do not include liquefied petroleum gases used by producers or their affiliated companies as fuel or as raw material or reacting agents in the manufacture of other products. Sales of petroleum gases to chemical manufacturing plants are included when the gases are delivered in a liquefied state.

TABLE I
Sales of Liquefied Petroleum Gases, 1932-37

(In thousands of gals.)

Year	Propane	Butane	Propane-butane mixtures	Pentane
1932	15,182	14,662	3,417	854
1933	15,835	19,056	3,226	814
1934	18,681	25,553	10,271	1,922
1935	26,814	34,084	13,492	2,465
1936	36,502	40,200[1]	27,375[1]	2,575
1937	46,474	45,504	46,694	2,833

[1] Revised figures.

From about 1933 through 1936, sales of butane comprised the major portion of total deliveries; however, the 1937 totals show about equal amounts for propane and propane-butane mixtures. Propane sales in 1937 of 46,474,000 gals., represent a gain of 27% over the 1936 total of 36,502,000 gals. The market demand for butane in 1937 was reported as 45,504,000 gals., or 13% above the 1936 deliveries of 40,200,000 gals. The ratio of butane sales to total deliveries of all liquefied petroleum gases declined from 38% in 1936 to 32% in 1937, while propane-butane mixtures, which constituted about one-fourth of total deliveries in 1936, increased to one-third in 1937. Quantitatively, propane-butane sales totaled 46,694,000 gals. in 1937, a gain of 71% over the 1936 requirements. Pentane deliveries, which are relatively unimportant in volume, increased from 2,575,000 gals. in 1936 to 2,833,000 gals. in 1937.

About half of the marketed production of liquefied petroleum gases is used for industrial fuel and in the manufacture of chemicals. Liquefied gas reported under these classifications totaled 70,102,000 gals. in 1937 compared with 54,585,000 gals. in 1936. Most of this gain must be credited to the increased use of liquefied petroleum gases in the chemical manufacturing trade, which demand virtually doubled in 1937. The use of liquefied petroleum gases as raw material in the making of chemicals is expanding at a rapid rate as their chemical structure is better understood and new processes for their conversion into desirable products are developed step by step from the experimental to the commercial stage. Liquefied petroleum gases sold to chemical plants are usually cracked or broken down chemically and then are further treated to produce ethylene glycol, alcohols, acetone and other derivatives. Still another process is based on the chlorination of pentane to produce amyl chlorides, which are then converted into other products. The sale of liquefied petroleum gases to chemical plants, which in the past year or two has reached an important volume, bids fair to continue to expand.

The quantity of liquefied petroleum gases sold for industrial fuel increased about 8% in 1937 over the 1936 requirements. This relatively moderate gain in 1937 is evidently due to some extent to the slowing up of industrial activities in the second half of the year. Extensive advertising of the merits of "bottled gas," improved equipment for its storage, handling and use and better service covering larger areas, were largely responsible for the expansion in the domestic demand for liquefied petroleum gases in 1937 to 40,823,000 gals., a gain of 36% over the 1936 total. Liquefied petroleum gases used by gas companies for direct distribution through their mains and for the enrichment of other gases before delivery to consumers increased from 9,371,000 gals. in 1936 to 11,280,000 gals. in 1937, or 20%. Liquefied petroleum gases sold for internal-combustion-engine fuel are becoming of important volume, sales for this purpose increasing from 12,476,000 gals. in 1936 to 16,987,000 gals. in 1937. This use of petroleum gases as motor fuel is confined largely to the California area, where sales of 15,000,000 gals. were reported for 1937.

Sales of propane for all purposes were reported as 46,474,000 gals. in 1937, compared with 36,502,000 gals. in 1936. Approximately two-thirds of the 1937 quantity, or 30,436,000 gals., were sold for domestic use, while about 14,500,000 gals. were delivered to industrial plants for fuel. Gas manufacturing companies purchased 1,077,000 gals. of propane in 1937, compared with 944,000 gals. in 1936. Minor quantities of propane sold as raw material to chemical manufacturers, for internal-combustion-engine fuel, are becoming of important volume. Butane, because of its higher heat content per gallon, is used principally as an industrial fuel, the quantities sold for this purpose being about 28,000,000 gals. for both 1936 and 1937.

Exports of liquefied petroleum gases declined in 1937. Formerly France has been an important buyer, but recently equipment has been installed at some French refineries for producing these gases from refinery vapors. Exports of liquefied petroleum gases by principal countries of destination are shown in Table 3.

TABLE II
Marketed Production of Liquefied Petroleum Gases by Uses, Methods of Transportation, and Regional Distribution, 1936-37

(Thousands of gallons)

	Propane	Butane	Propane-butane mixtures	Pentane	Total 1937	Per cent. 1937	Total 1936	Per cent. 1936
By uses:								
Domestic	30,436	6,047	3,504	836	40,823	28.9	30,014	28.1
Gas manufacturing	1,077	7,430	2,765	8	11,280	8.0	9,371	8.8
Industrial fuel and chemical manufacturing	14,567	28,278	25,300	1,957	70,102	49.5	54,585	51.2
Internal-combustion-engine fuel	278	1,715	14,994	....	16,987	12.0	12,476	11.7
All other uses	116	2,034	131	32	2,313	1.6	206	.2
Total	46,474	45,504	46,694	2,833	141,505	100.0	106,652	100.0
Per cent. 1937	32.8	32.2	33.0	2.0	100.0	....	......	....
Per cent. 1936	34.2	37.7[1]	25.7[1]	2.4	100.0	....	......	....
By methods of transportation:								
Bulk	22,650	43,698	42,589	2,642	111,579	78.9	82,575	77.4
Cylinders and drums	23,824	1,806	4,105	191	29,926	21.1	24,077	22.6
Total	46,474	45,504	46,694	2,833	141,505	100.0	106,652	100.0
Regional distribution:								
Pacific Coast area	6,266	5,447	18,085	....	29,798	21.1	23,646	22.2
All other areas	40,208	40,057	28,609	2,833	111,707	78.9	83,006	77.8
Total	46,474	45,504	46,694	2,833	141,505	100.0	106,652	100.0

[1] Revised figures.

Liquefied Petroleum Gases, 1937
Production and Sales—p. 1

Liquefied Petroleum Gases, 1937

Exports, p. 2

TABLE III

Exports of Liquefied Petroleum Gases, 1935-37

(Thousands of gallons)

Countries of destination:	Propane 1935	Propane 1936	Propane 1937	Butane 1935	Butane 1936	Butane 1937	Propane-butane mixtures 1935	Propane-butane mixtures 1936	Propane-butane mixtures 1937	Total 1935	Total 1936	Total 1937
United Kingdom	41	26	..	....	....	....	..	..	1	41	26	1
Netherlands	..	..	..	....	602	....	..	..	..	..	602	....
France	26	28	..	4,012	4,083	1,279	..	17	22	4,038	4,128	1,301
Italy	..	..	78	....	....	....	..	..	..	....	....	78
Canada	..	1	66	97	....	124	..	..	..	97	1	190
Mexico	..	39	1	61	84	209	..	..	43	61	123	253
All other countries	..	6	14	....	....	....	..	11[1]	42[1]	....	17	56
Total	67	100	159	4,170	4,769	1,612	..	28	108	4,237	4,897	1,879

[1] Contains 1,000 gallons of pentane.

Note.—The data for the California area were compiled by E. T. Knudsen, Assistant Economic Analyst, United States Bureau of Mines, San Francisco, California.

PHYSICAL AND CHEMICAL PROPERTIES

Formula	Methane CH_4	Ethane CH_3CH_3	Ethylene CH_2CH_2	Propane $CH_3CH_2CH_3$	Butane $CH_3CH_2CH_2CH_3$	Isobutane $CH_3CH_3CH.CH_3$	Propylene $CH_3CH{:}CH_2$	Butylene $CH_3CH_2CH{:}CH_2$
Mol. Wt.	16.032	30.048	28.032	44.064	58.080	58.080	42.048	56.264
B. P.° C.	—161.6	—88.3	—103.9	—44.5	0.3	—13.4	—47.0	—5.0
Density of Liquid at 0° C.	......	0.446	0.610	0.531	0.599	0.582	0.581	0.622
Density of Vapor at 0° C., 760 mm. (Air = 1)	0.554	1.04	0.975	1.56	2.07	2.07	1.46	1.94
Critical Temp.: 0° C.	—82.1	32.1	9.5	95.6	153.2	133.7	92.1	150.0
Critical Pressure lbs. per sq. inch absolute	672	718	744	661	525	536	666	530
Specific Heat at Constant Pressure Cp.	0.593	0.397	......	0.365	0.351	0.351	......	......
Specific Heat at Constant Volume Cv.	0.4495	0.325	......	0.315	0.317	0.316	......	......
Ratio of Specific Heats (Cp/Cv)	1.319	1.224	......	1.153	1.108	1.111	......	......
Explosive Limits in Air % by volume; lower, upper	5.3–14.0	3.2–12.5	3.0–34.0	2.4–9.5	1.9–8.5	1.9–8.5	2.2–9.7	1.7–9.0

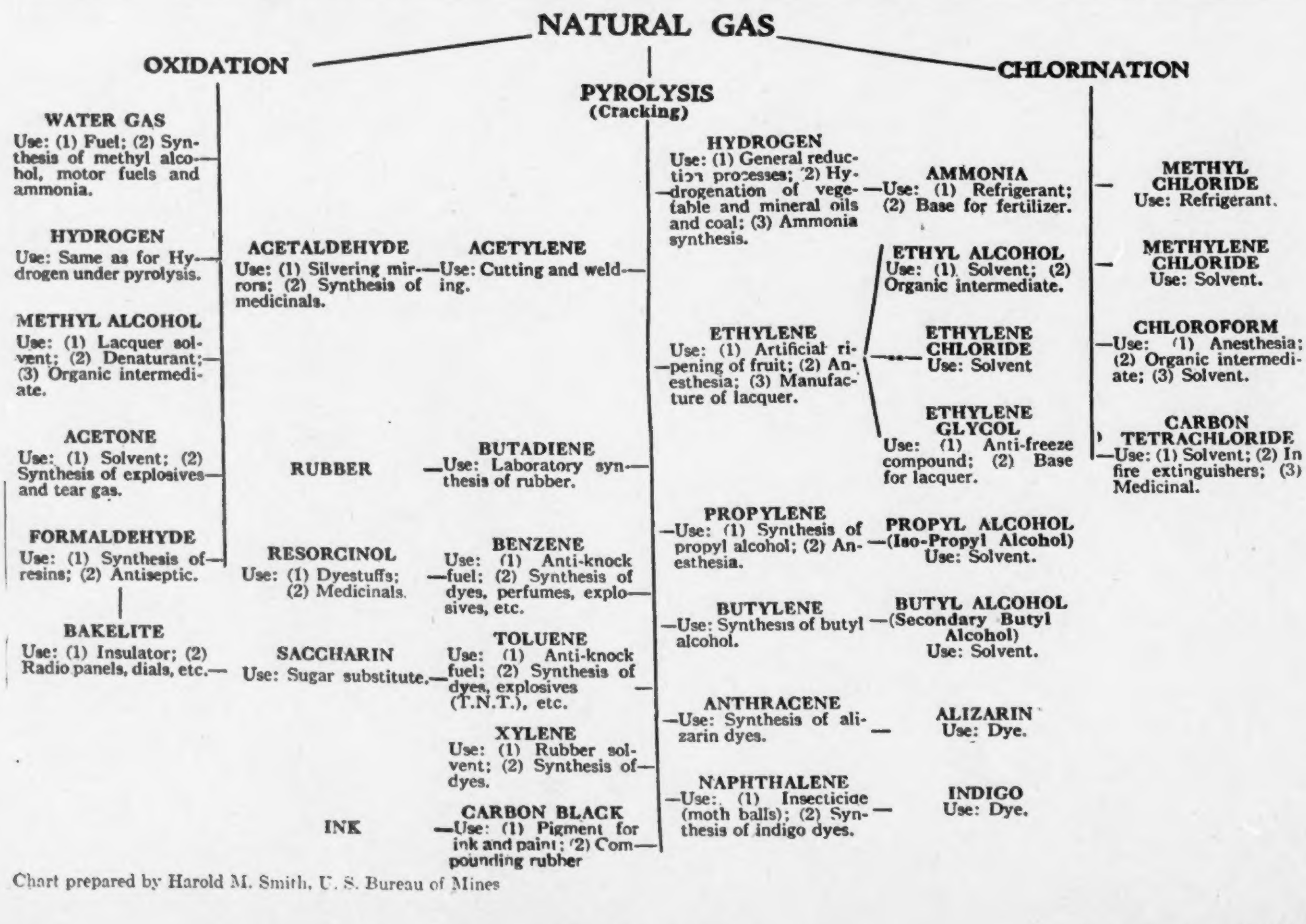


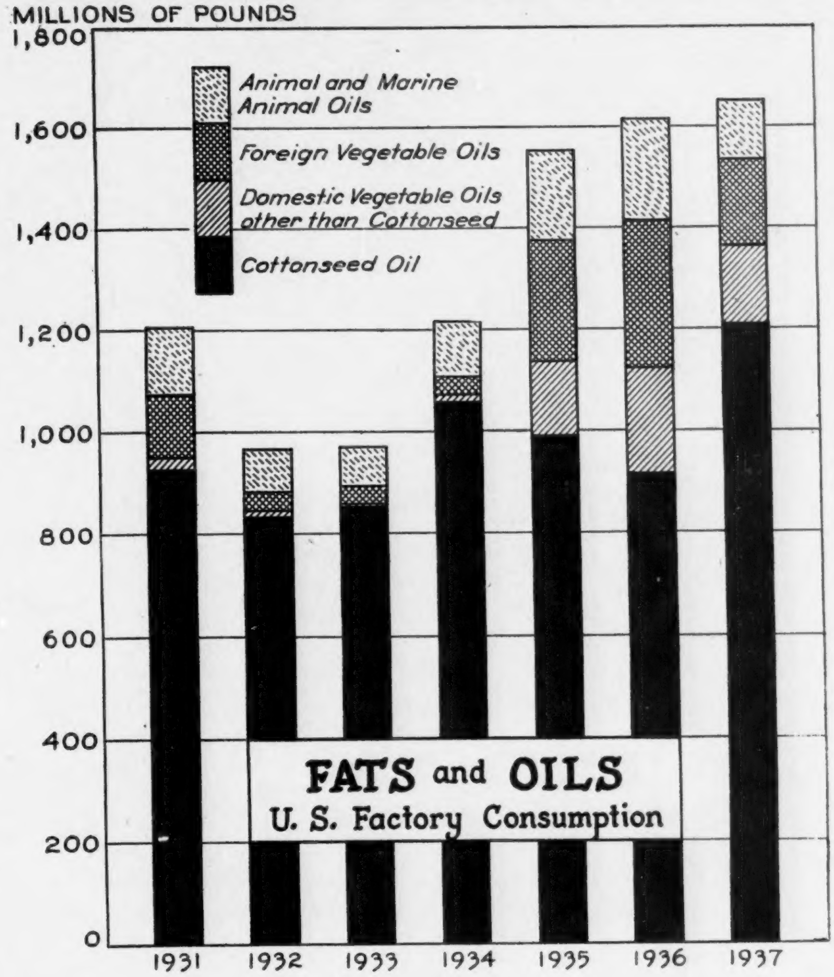
Chart prepared by Harold M. Smith, U. S. Bureau of Mines

Fats and Oils, 1937

Distribution of primary animal and vegetable fats and oils consumed in factory operations in the U. S. during the calendar year 1937, by classes of products in which used, is presented in the tabular statement below. Data for oleo stock were not collected, hence the secondary products, edible animal stearin and oleo oil, are shown. The statistics were compiled from the quarterly reports of the several concerns to the Bureau of the Census, supplemented by special statements covering the entire year for those manufacturing more than one class of products.

Total consumption in all industries for each item is the same as given in the Bureau of the Census bulletin for 1937, except for those vegetable oils for which the crude and refined products are indicated in the questionnaire, namely, cottonseed, peanut, coconut, corn, soybean, palm-kernel, palm, and babassu oils. For each of these a net consumption was arrived at by deducting from the total of both crude and refined consumed the quantity of refined produced.

Oils subjected to the process of hydrogenation or other treatment for special uses were reported as consumed in the products for which intended. For example: Oils treated for soap manufac-



FACTORY CONSUMPTION OF PRIMARY ANIMAL AND VEGETABLE FATS AND OILS, BY CLASSES OF PRODUCTS, 1937

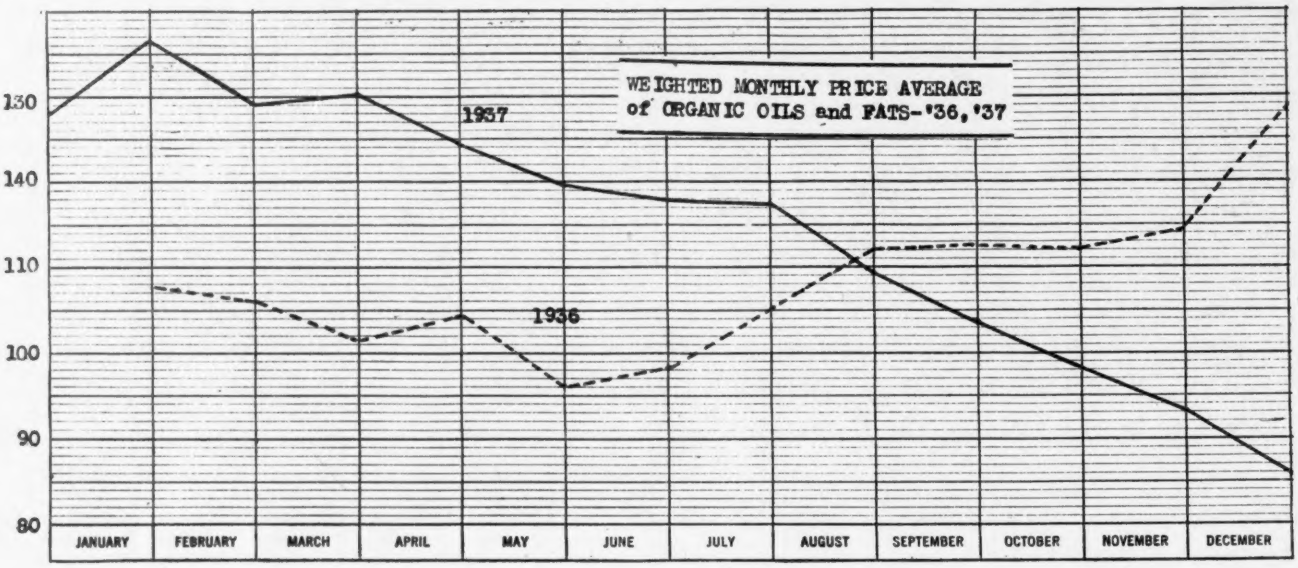
(Quantities in thousands of lbs.)

KIND	TOTAL	Shortening	Oleomargarine	Other Edible Products	Soap	Paint and Varnish	Linoleum and Oilcloth	Printing Inks	Miscellaneous Products	Loss including Foots
Total	4,993,914	1,651,841	324,905	395,684	1,475,756	457,785	102,763	26,213	351,766	207,201
Cottonseed oil	1,716,822	1,209,596	173,615	209,647	8,414	43	......	167	2,632	112,708
Peanut oil	67,515	58,141	2,880	1,937	820	......	......	.....	22	3,715
Coconut oil	425,894	12,531	73,806	49,886	252,241	1,124	......	2	6,846	29,458
Corn oil	83,812	1,611	1,796	63,883	2,392	89	......	......	4,005	10,036
Soybean oil	178,516	90,798	31,793	15,530	10,274	16,143	934	80	3,038	9,926
Olive oil, edible	3,296	......	......	3,180	21	......	......	......	95	......
Olive oil, inedible	5,568	......	......	......	890	......	......	......	4,678	......
Sulfur oil or olive foots	18,361	......	......	......	17,984	......	......	......	377	......
Palm-kernel oil	144,041	47	7,946	21,294	111,514	......	......	......	63	3,177
Palm oil	331,054	123,677	1,063	944	141,358	......	......	3	*33,303	30,706
Babassu oil	42,063	127	14,606	11,294	14,308	......	......	......	......	1,728
Rapeseed oil	14,336	5,203	......	......	981	138	......	1	7,493	520
Linseed oil	375,220	1,522	......	......	1,359	267,184	68,151	20,342	16,510	152
Chinawood oil	120,378	......	......	......	......	105,731	7,198	2,762	4,687	......
Perilla oil	42,537	......	......	......	2	31,776	8,053	1,752	954	......
Castor oil	34,812	......	......	......	2,123	6,455	1,653	260	24,321	......
Sesame oil	37,667	29,269	1	3,435	2,944	......	......	......	81	1,937
Other vegetable oils	25,985	870	......	5,848	10,812	1,498	9	17	6,334	597
Lard	8,938	915	1,747	2,246	......	......	......	3	3,974	53
Edible animal stearin	38,711	29,664	3,375	4,926	321	......	......	......	411	14
Oleo oil	13,055	242	12,277	41	74	......	......	......	402	19
Tallow, edible	68,896	66,278	......	1,593	143	......	......	2	712	168
Tallow, inedible	675,918	......	......	......	613,509	151	......	7	61,921	330
Grease	215,651	......	......	......	94,247	150	......	509	120,421	324
Neat's-foot oil	5,595	......	......	......	16	15	......	1	5,553	10
Marine animal oils	70,196	66	......	......	65,130	11	......	7	4,967	15
Fish oils	229,077	21,284	......	......	123,879	27,277	16,765	298	37,966	1,608

* Includes 30,708 thousand lbs. reported by the tin and terne plate industry.

Fats and Oils, 1937-38, p.1

Fats and Oils, 1937-38, p.2



ture were entered in the column headed "Soap" and oils intended for edible purposes were entered in one or more of the columns covering edible products. The ultimate uses of the primary oils are designated in this way.

Industrial consumption of vegetable and other oils by the paint and varnish, linoleum and oilcloth, and printing ink industries increased only 6½% to a total of 586,672,000 lbs. from the 550,756,000 consumed during '36, but was more than 80% above the 322,189,000 lbs. reported to the Bureau of the Census as being consumed in '32.

Total consumption of such materials by the paint and varnish—chiefly linseed, tung, perilla, soybean, castor and fish oils—gained approximately 7% compared with '36; linoleum and oilcloth industry used 1% more oils; and consumption in the manufacture of printing inks advanced approximately 30%.

Oil consumption by the paint and varnish industry was characterized last year by greater use of linseed, tung, soybean, castor and fish oils and a sharp reduction in the use of perilla. The linoleum and oilcloth industry used more linseed, about the same amounts of tung and fish oils, but 50% less perilla oil, while the printing ink industry, with the exception of castor and perilla, increased consumption of all types of oils—particularly linseed, tung and fish oils.

Estimates made by the Chemical Division indicate a total consumption of 148,500,000 lbs. of Chinese tung oil last year, an all time record, which compares with an estimated consumption of 119,000,000 in '36; 127,600,000 in '35; 115,000,000 in '34; and 103,700,000 in '33. These estimates were arrived at by taking stocks on hand at the beginning of each year plus imports and deducting reexports and year end stocks.

Sharply curtailed consumption of drying oils from the high point in early '37 has brought stocks of linseed oil, tung oil and perilla oil to a record high. Estimated

AVERAGE MONTHLY PRICE INDEX OF ORGANIC OILS AND FATS*

(Base period Aug. 1, 1909-July 31, 1914)

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	1938 Jan.	1938 Feb.
Grease	144.4	141.6	145.8	142.6	134.8	134.8	133.3	125.4	110.3	92.8	84.9	74.4	83.7	81.9
Lard	130.6	118.1	119.4	111.4	114.2	115.1	117.3	111.2	108.0	99.0	95.6	83.5	85.1	87.8
Castor oil	102.1	102.1	102.1	102.1	102.1	102.1	102.1	102.1	102.1	102.1	102.1	102.1	92.4	92.4
Chinawood oil.	158.3	170.5	174.5	167.2	155.4	144.6	144.0	166.5	255.0	253.8	184.5	173.6	181.2	172.7
Coconut oil ..	116.3	110.4	107.8	95.7	82.2	71.6	65.2	59.0	54.2	56.4	51.0	48.7	50.3	47.3
Cod oil	107.4	109.7	109.7	111.3	111.8	111.8	111.8	111.8	111.8	111.8	111.8	111.8	111.8	111.8
Corn oil	169.3	163.9	160.3	161.5	141.2	136.7	131.5	125.3	112.1	109.3	105.1	104.0	108.7	117.5
Herring oil ...	85.1	....	....	....	....	....	....	....	....	....	....	....	....	....
Linseed oil ...	113.6	111.1	117.4	125.8	125.8	123.6	123.8	123.6	121.6	122.5	118.1	114.9	114.1	111.9
Menhaden oil..	123.6	131.6	149.2	152.9	145.3	149.5	138.1	136.0	126.2	120.9	120.0	124.6	129.5	129.5
Olive oil	195.4	197.8	191.8	191.8	182.8	179.9	179.9	166.6	155.8	155.8	151.4	141.5	137.8	127.1
Olive oil foots.	154.0	176.7	169.3	162.2	159.5	158.7	158.7	157.0	151.6	149.4	142.0	137.5	131.9	129.6
Oleo oil	139.0	133.0	130.1	123.9	120.0	124.0	125.5	124.3	125.5	125.5	123.3	116.8	94.1	91.7
Palm oil	94.6	81.9	83.8	78.3	67.3	68.6	67.2	66.2	57.2	54.0	51.7	50.6	50.6	50.3
Palm kernel oil	93.3	82.4	82.9	75.5	65.5	64.0	61.2	59.1	53.5	55.7	52.7	50.1	47.3	46.7
Peanut oil ...	142.8	138.1	137.8	134.9	123.8	119.2	110.8	106.5	95.9	87.8	95.1	89.9	91.2	88.8
Rapeseed oil ..	130.2	130.7	135.7	140.3	144.5	145.3	146.4	147.7	146.0	144.9	141.0	138.3	138.4	138.4
Sesame oil ...	126.7	126.7	125.2	124.3	117.1	113.6	109.9	109.9	105.2	100.4	100.4	99.4	99.2	99.2
Soybean oil ..	157.2	157.2	157.2	159.4	157.2	144.2	142.2	129.2	121.3	106.7	104.8	92.8	96.3	102.5
Whale oil	127.4	152.9	152.9	152.9	155.9	158.9	157.7	148.9	142.4	142.4	142.4	142.4	142.4	142.4
Stearin, oleo ..	107.7	94.0	93.1	90.7	86.2	85.6	87.2	86.5	80.5	85.1	81.7	73.2	68.7	67.0
Tallow	127.4	126.0	128.0	122.8	116.4	117.7	115.5	108.8	102.7	92.1	83.6	77.0	82.7	74.9
Cottonseed oil.	179.5	174.4	174.3	169.0	154.3	150.6	148.9	125.4	110.0	102.4	104.8	101.6	108.1	116.1
Weighted aver.	136.5	129.3	130.2	124.2	119.5	118.0	117.6	109.2	103.9	97.2	93.1	85.6	88.4	89.7

* Bureau of Raw Materials for American Vegetable Oils and Fats Industries, Washington, D. C.

PRINCIPAL VEGETABLE OILS, PRODUCTION, CONSUMPTION, STOCKS, 1937*

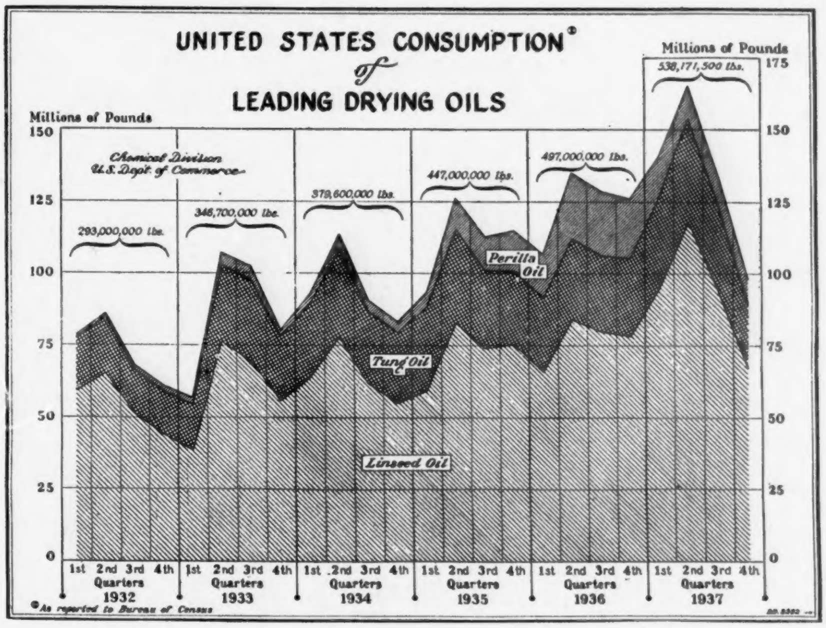
	Production		Consumption		Stocks	
	1937	1936	1937	1936	Dec. 31, 1937	Dec. 31, 1936
Cottonseed, crude	1,628,672,352	1,244,616,982	1,562,674,540	1,246,055,768	200,643,988	143,385,529
Cottonseed, refined	1,450,319,085	1,159,027,720	1,573,248,783	1,169,985,324	447,576,407	427,767,606
Peanut, crude	50,724,281	69,822,493	58,461,980	106,599,150	4,311,751	12,103,948
Peanut, refined	64,494,445	100,057,174	57,130,890	94,893,637	19,163,280	16,084,750
Coconut, crude	266,419,787	258,088,503	453,125,749	590,484,197	165,993,655	59,551,067
Coconut, refined	268,067,067	340,469,323	241,965,550	358,822,533	10,542,683	15,457,567
Corn, crude	126,095,341	121,994,058	156,160,324	157,427,675	8,912,271	11,635,556
Corn, refined	140,107,224	138,124,809	67,765,022	42,973,471	8,889,264	12,875,656
Soybean, crude	194,132,315	225,297,183	158,118,550	202,524,285	44,897,441	20,303,343
Soybean, refined	133,472,517	180,722,187	155,774,524	162,105,421	16,508,560	12,301,564
Palm-Kernel, crude	....	....	139,234,131	64,808,764	41,033,767	12,530,802
Palm-Kernel, refined	26,202,260	37,471,771	31,005,188	31,748,898	787,595	1,720,917
Rapeseed	....	....	14,761,404	52,335,777	5,064,936	14,210,486
Linseed	665,098,850	455,252,646	374,468,861	307,522,178	191,386,262	117,267,639
China wood	....	....	120,361,467	108,454,298	48,484,511	28,872,045
Perilla	....	....	43,310,497	80,830,309	23,716,308	19,752,392
Castor	68,823,645	84,553,321	35,101,773	31,736,912	18,654,103	12,134,164
Palm	....	28,158,923	363,281,348	283,554,508	154,280,509	92,030,197
Sesame	....	65,537,230	37,667,407	55,653,729	5,484,841	11,572,852
Babassu	35,678,179	27,739,787	41,062,096	34,674,749	3,186,047	1,912,625
Hempseed	....	12,656,415	1,387,913	11,510,960	....	2,013,197

* Source Quarterly Statements, Bureau of the Census; all figures in pounds.

consumption of all oils in the drying industries in the first quarter of '38 was approximately a third less than in the first 3 months of '37.

Combined stocks of the 3 major drying oils—linseed oil, tung oil, and perilla oil—totaled more than 298 million lbs. at the end of March '38. A year earlier stocks of these oils amounted to 183 million lbs.

Imports of drying oils during the first quarter of '38 showed a decided downward trend except in the case of perilla oil, imports of which increased slightly over those of a year ago.* Prices of all drying oils averaged lower in April than at the beginning of '38 and lower than in April last year.



Other Drying Oils

Prior to the imposition of an excise tax considerable quantities of the oil were imported—total reaching the high figure of 118,000,000 lbs. in '36. Last year, however, aggregate declined to 43,590,600 lbs. Small quantities of seed have been imported in recent years. In '35 imports of seed amounted to 2,782,600 lbs. and in the year following the total advanced to 3,742,370 lbs. Last year, however, only 200,000 lbs. of perilla seed were brought in.

Reports to the Bureau of the Census indicate that 8,304,000 lbs. of perilla oil were consumed in the first quarter of '38. Approximately 13,686,200 lbs. were consumed in the first 3 months of last year and 43,310,500 during the whole of '37.

Imports of oiticica oil aggregated 2,892,000 lbs. in '36; 3,631,150 lbs. in '37; and 306,720 lbs. in the first quarter of '38. Consumption and stock data on this oil are not compiled.

*For import figures for 1937 see Statistical and Technical Data Section, Exports, Imports, May, p.605.

U. S. PRODUCTION LINSEED OIL**

Year	Total Pounds	Jan. 1 to March 31. Pounds	April 1 to June 30. Pounds	July 1 to Sept. 30. Pounds	Oct. 1 to Dec. 31. Pounds
1938	....	125,587,390	....	....	....
1937	665,098,850	156,877,263	206,511,823	151,278,120	150,431,644
1936	455,959,464	132,136,919	100,118,519	91,805,153	131,898,873
1935	502,043,424	111,822,663	116,946,404	116,666,553	156,607,804
1934	370,768,585	97,451,809	98,025,913	85,037,681	90,253,182
1933	405,948,180	79,595,129	79,034,580	113,412,535	133,905,936

U. S. CONSUMPTION LINSEED OIL*

Year	Total Pounds	Jan. 1 to March 31. Pounds	April 1 to June 30. Pounds	July 1 to Sept. 30. Pounds	Oct. 1 to Dec. 31. Pounds
1938	....	63,874,555	....	....	....
1937	374,468,851	94,980,998	118,260,108	93,816,524	67,411,221
1936	305,329,679	65,128,254	82,397,832	79,701,761	78,101,802
1935	291,683,903	59,406,538	83,082,616	73,809,240	75,385,509
1934	258,483,721	63,519,296	78,167,202	61,677,514	55,119,709
1933	241,325,068	38,418,662	76,496,472	70,626,554	55,783,380

* Bureau of the Census, Dept. of Commerce.
** Represents oil recovered from both imported and domestically produced flaxseed.

Fats and Oils, 1937-38, p.3

Fats and Oils, 1937-38, p.4

First Quarter Figures

Factory production of fats and oils (exclusive of refined oils and derivatives) during the 3 month period ending Mar. 31, '38, was as follows: Vegetable oils, 962,736,893 lbs.; fish oils, 39,446,777 lbs.; animal fats, 454,765,615 lbs; and greases 80,484,263 lbs.—a total of 1,537,433,548 lbs. Of the several kinds of fats and oils covered by this inquiry, largest production, 595,684,051 lbs., appears for cottonseed oil. Next in order is lard with 299,874,140 lbs.; tallow with 153,801,736 lbs.; linseed oil with 125,587,390 lbs.; soybean oil with 81,570,327 lbs.; coconut oil with 74,655,516 lbs.; corn oil with 31,972,613 lbs.; peanut oil with 22,187,962 lbs.; castor oil with 14,045,302 lbs.; and babassu oil with 11,965,280 lbs.

Production of refined oils during the period was as follows: Cottonseed 579,612,544 lbs.; coconut 70,287,534 lbs.; peanut 14,782,890 lbs.; corn 36,859,616 lbs.; soybean 51,864,348 lbs.; palm-kernel 3,929,005 lbs.; palm 28,196,457 lbs.; and babassu 7,366,291 lbs. Quantity of crude oil used in the production of each of these refined oils is included in the figures of crude consumed.

Data for the factory production, factory consumption, imports, exports and factory and warehouse stocks of fats and oils and for the raw materials used in the production of vegetable oils for the three month period appear in the opposite statement.

Exports of Tung Oil

Statistics on tung oil exports from China are incomplete for 1937 due to the Sino-Japanese situation. Prices soared when the undeclared war first broke out on the assumption that it would virtually be impossible to get supplies through. However, after the first few months it became apparent that despite difficulties shipments would be made—this and the fact that consumption started to drop sharply in the U. S. brought a sharp reaction in prices.

EXPORTS OF TUNG OIL FROM HANKOW, CHINA TO U. S., EUROPE, AND HONG KONG*

1937
(In short tons of 2,000 lbs. each)

Month	To U. S. A.	To Europe	Total	Hankow Stocks
Jan.	7,590	495	8,085	1,030
Feb.	7,033	603	7,636	190
Mar.	6,001	792	6,793	560
Apr.	6,328	543	6,871	960
May	7,927	1,058	8,985	3,500
June	14,043	572	14,614	4,180
July	9,042	1,826	10,868	2,860
Aug.	3,900	1,332	5,382	5,780
Sept.	274	144	418	10,120
Oct.	3,339	716	4,055	6,500
Nov.	(d)	(d)	500	9,000
Dec.	1,065	299	1,364	9,000
Total			75,571	

(d) Cable did not specify destination of November shipments.
* Source the Tung Oil Monthly.

PRODUCTION, CONSUMPTION AND STOCKS OF FATS AND OILS

Kind	Factory operations for the quarter ending March 31, 1938 Production (pounds)	Consumption (pounds)	Factory and Warehouse stocks March 31, 1938
Vegetable Oils (1)			
Cottonseed, crude	595,684,051	642,897,707	163,846,863
Cottonseed, refined	579,612,544	455,021,405	564,285,815
Peanut, virgin and crude	22,187,962	16,034,835	6,931,204
Peanut, refined	14,782,890	14,573,648	19,522,169
Coconut or copra, crude	74,655,516	122,112,551	197,129,705
Coconut or copra, refined	70,287,534	63,432,580	12,392,253
Corn, crude	31,972,613	40,320,541	7,123,374
Corn, refined	36.859,616	17,025,513	9,584,032
Soybean, crude	81,570,327	59,905,734	60,007,073
Soybean, refined	51,864,348	49,635,343	19,271,227
Olive, edible	1,863,550	501,418	3,554,471
Olive, inedible	(2)	904,977	1,498,401
Sulfur oil or olive foots	....	3,219,442	5,920,770
Palm-kernel, crude	(2)	25,193,288	14,577,180
Palm-kernel, refined	3,929,005	4,215,057	1,526,839
Palm, crude	....	69,842,945	146,888,333
Palm, refined	28,196,457	27,442,140	10,170,962
Babassu, crude	11,965,280	10,693,077	5,965,429
Babassu, refined	7,366,291	9,388,302	664,859
Rapeseed	....	1,278,647	3,904,613
Linseed	125,587,390	63,874,555	223,108,638
Chinese wood or tung	(2)	20,790,600	51,440,321
Perilla	....	8,304,097	24,008,462
Castor	14,045,302	6,596,562	20,245,509
Sesame	....	2,278,637	2,003,170
All other	3,204,902	6,393,758	18,580,857
Fish Oils (1)			
Cod and cod-liver	297,843	4,056,570	18,886,870
Other fish oils	(3)11,764,934	28,586,966	84,408,370
Marine animal oils	27,384,000	17,853,190	81,981,709
Animal Fats:			
Lard, neutral	1,431,331	648,519	520,802
Lard, other edible	298,442,809	1,836,787	122,405,782
Tallow, edible	21,783,423	16,146,955	10,482,684
Tallow, inedible	132,018,313	166,396,394	225,972,414
Neat's-foot oil	1,089,739	1,372,673	1,623,893
Greases:			
White	14,997,822	8,458,025	10,525,588
Yellow	18,828,278	10,760,203	15,861,554
Brown	14,129,698	9,696,601	17,106,258
Bone	5,651,845	197,725	1,522,667
Tankage	9,985,224	1,602,638	2,775,586
Garbage or house	11,443,362	7,272,621	14,615,801
Wool	816,108	962,133	1,732,034
All other	4,636,926	2,782,535	4,640,441
Other Products:			
Shortening	433,472,545	335,500	50,759,641
Hydrogenated oils	188,974,103	167,547,488	25,667,255
Stearin, vegetable	24,312,679	22,932,356	7,672,901
Stearin, animal, edible	12,713,268	10,726,693	5,685,658
Stearin, animal, inedible	2,846.303	1,626,581	3,223,347
Oleo oil	24,490,162	3,180,447	6,997,041
Lard oil	6,414,560	1,917,944	7,523,295
Tallow oil	2,115,439	1,155,793	2,013,418
Fatty acids	32,221,841	28,786,593	8,360,908
Fatty acids, distilled	13,353,599	13,269,391	5,301,055
Red oil	7,338,629	4,727,810	10,541,468
Stearic acid	5,845,964	2,510,996	3,856,839
Glycerin, crude 80% basis	39,169,657	40,665,716	13,411,721
Glycerin, dynamite	10,618,713	6,157,845	18,718,582
Glycerin, chemically pure	22,232,421	4,814,315	35,342,664
Cottonseed foots, 50% basis	108,549,907	110,275,070	32,346,417
Cottonseed foots, distilled	17,659,681	13,032,625	4,468,149
Other vegetable oil foots, 50% basis	31,086,658	22,338,339	4,326,017
Other vegetable oil foots, distilled	....	222,733	154,384
Acidulated soap stock	47,397,239	28,936,617	55,058,299
Miscellaneous soap stock	142,614	359,838	978,923

(1) The data of fish oil producers and fish canners collected by Bureau of Fisheries.
(2) Included in "All Other" vegetable oils.
(3) Includes 11,083,725 pounds herring and sardine, 240,598 pounds menhaden and 440,611 pounds miscellaneous fish oils.

U. S. Chemical Patents

Off. Gaz.—Vol. 489, Nos. 3, 4—490, Nos. 1, 2, 3, 4—p. 29

Agricultural Chemicals

Production dicalcium phosphate, first digesting phosphate rock with sulfuric acid. No. 2,115,150. Warren R. Seyfried, Birmingham, Ala.

Production fertilizers; solution of sodium nitrate and ammonium nitrate in an ammoniacal solution. No. 2,116,866. Walter H. Kniskern, Petersburg, Va., and Charles K. Lawrence, Baldwinsville, N. Y., to Solvay Process Co., New York City.

Fertilizer having as fertilizer constituents water soluble, chemically degraded protein cleavage product and water soluble carbohydrate. No. 2,117,087. Richard Formhals to Chemische Fabrik Grunau, Landshoff & Meyer Akt. Ges., both of Berlin-Grunau, Germany.

Preparation granulated fertilizer, using ammonium nitrate in process. No. 2,118,438. Chas. K. Lawrence, Baldwinsville, N. Y., and Aylmer H. Maude, Prince George County, Va., to Solvay Process Co., New York City.

Preparation granulated fertilizer, using urea in process. No. 2,118,439. Chas. K. Lawrence, Baldwinsville, and Aylmer H. Maude, Niagara Falls, N. Y., to Solvay Process Co., New York City.

Cellulose

Manufacture pellicles from aqueous solutions or dispersions of cellulosic material. No. 2,115,132. Frank P. Alles, Buffalo, and David H. Edwards, Kenmore, N. Y., to du Pont, Wilmington, Del.

Preparation composition containing cellulose derivatives. No. 2,115,708. Henry Dreyfus, London, Eng.

Pretreatment cellulose preparatory to acylation, using bath comprising a lower fatty acid and a lower fatty acid anhydride. No. 2,115,735. Carl J. Malm, Rochester, N. Y., to Eastman Kodak Co., Jersey City, N. J.

Production non-fibrous, cellulosic pellicles. No. 2,116,193. Donald E. Drew, Kenmore, N. Y., to du Pont, Wilmington, Del.

Bleaching regenerated cellulose structures; treating same with an aqueous solution of chlorine having a pH value of less than 4.0. No. 2,116,210. Edward R. McKee, Hermitage, Tenn., to du Pont, Wilmington, Del.

Manufacture artificial sponges; molding pasty mass having a basis of a cellulose derivative. No. 2,116,611. Leon Pierre Georges Vautier, St. Just des Marais, and Claude Carnot, Paris, France, to Societe Francaise de la Viscose, S. A., corp. of France.

Preparation cellulose xanthate solution from sheets of cellulose fiber; using caustic soda solution in process. No. 2,117,037. George A. Richter, to Brown Co., both of Berlin, N. H.

Preparation cellulose xanthate solutions, involving reaction of cellulose fiber, caustic soda solution, and liquid carbon bisulfide. No. 2,117,038. George A. Richter, to Brown Co., both of Berlin, N. H.

Manufacture cellulose, subjecting chemical wood pulps to treatments with caustic alkali solutions of different concentrations. No. 2,118,039. Henry Dreyfus, London, Eng.

Manufacture cellulose; subjecting unpulped ligno-cellulosic materials to treatment with a bisulfite solution containing free sulfur dioxide, followed by treatment with dilute alkali. No. 2,118,074. Henry Dreyfus, London, Eng.

Preparation nitrocellulose; nitrating cellulose with bath containing nitric and sulfuric acids. No. 2,118,275. Ralph H. Talbot to Eastman Kodak Co., both of Rochester, N. Y.

Chemical Specialties

Lubricating grease composed of a lubricating oil admixed with a metallic salt of a rosin. No. 20,709. Reissue. Donald A. Lister, Brunswick, Ga., to Hercules Powder Co., Wilmington, Del.

Liquid waterproofing composition, comprising a water insoluble soap, a hydrogenated fat, and an alcoholic dispersing agent. No. 2,115,017. John Herman Gardthausen, Long Island City, N. Y., to Drigard Products Corp., New York City.

Insecticide having as its essential, active ingredient a nitrated tolyl ether. No. 2,115,046. Lloyd E. Smith, Washington, D. C.; dedicated to free use of People of the U. S.

Preservative for casting dies, etc., an oil having high heat resistive qualities, graphite, and lime mixed together to provide a viscous fluid mixture. No. 2,115,127. George W. Smith, Dayton, O.

Abrasive or like polishing materials; consisting of fine uniform grains of gypsum material containing phosphoric acid and an alkaline phosphate. No. 2,115,197. Robert Seaver Edwards, Milton, Mass., to Rumford Chemical Works, Rumford, R. I.

Adhesive consisting of a solution of zein in an aqueous organic solvent mixture containing formaldehyde and a lower aliphatic acid. No. 2,115,240. Oswald Sturken, Closter, N. J., to Corn Products Refining Co., New York City.

Method controlling leaf penetration quality of an insecticidal spray oil; dissolving in oil an oil-soluble aluminum soap of a sulfonated oil. No. 2,115,380. Elmer W. Adams, Hammond, Ind., to Standard Oil Co., Chicago, Ill.

Composition for treating metallic surfaces, consisting of gilsonite asphaltum and fish oil pitch, finally incorporating asbestos fibre and dried sawdust into mix. No. 2,115,425. Orville V. McGrew, Chicago, Ill.

Preservation oxidizable materials which tend to deteriorate by absorption of oxygen from the air. No. 2,115,473. Waldo L. Semon, Silver Lake Village, O., to B. F. Goodrich Co., New York City.

Manufacture improved materials containing collagen derived material, using an oil and an aqueous medium in process. No. 2,115,484. Wilfred Graham Dewsbury, London, and Arnold Davies, West Norwood, London, Eng.

Wall paper paste, dry powder comprising wheat flour, sugar, alum, and oil of wintergreen. No. 2,115,487. Ike Doveberg, Phila., Pa.

Asphalt road containing a vitreous, siliceous composition consisting of glass fibers present in the form of fabric. No. 2,115,667. Carleton Ellis, Montclair, N. J., to Ellis Labs., Inc., corp. of N. J.

Manufacture wetting, cleansing, and dispersing agents; oleylating alkoxy arylamine monosulfonic acids of the benzene series, which contain no more than 2 carbon atoms in the alkoxy group, with oleic acid chloride in an aqueous alkaline medium. No. 2,115,758. Alfred Williams Baldwin, Blackley, Manchester, England, to Imperial Chemical Industries, Ltd., corp. of Great Britain.

Treatment oils with sulfuric acid and preparation improved wetting agents and detergents. No. 2,115,807. Stewart C. Fulton and Hans G. Vesterdal, Elizabeth, N. J., to Standard Oil Development Co., corp. of Del.

Lubricating composition composed of a viscous waxy mineral oil containing an ether of cellulose. No. 2,115,823. Floyd L. Miller and Carl Winning, Elizabeth, N. J., to Standard Oil Development Co., corp. of Del.

Treatment oils with sulfuric acid and preparing improved wetting agents and detergents. No. 2,115,847. Edwin J. Gohr, Elizabeth, N. J., to Standard Oil Development Co., corp. of Del.

Insecticides; stabilized calcium arsenate. No. 2,115,933. Arthur L. Smith and Rowen D. Curtis, Oakland, Calif., to Sherwin-Williams Co., corp. of Ohio.

Filler for gas mask canisters; grain hulls, the hollows of which contain a paste formed of grain hull ash and a solution of nickel chloride. No. 2,115,946. Frederick M. Eaton, Carson City, Nev., to E. D. Bullard Co., San Francisco, Calif.

Filler for gas mask canisters; grain hulls having pulverulent material deposited in the hollows, pulverulent material being wet with a water solution of a chemical having an affinity for ammonia. No. 2,115,973. Cornelius S. Fleming, Berkeley, Calif., to E. D. Bullard, San Francisco, Calif.

Preparation waterproof materials having good phosphorescent properties, using an aluminum compound in process. No. 2,116,167. Hermann Espig, Bitterfeld, Germany, to I. G., Frankfort-on-Main, Germany.

Manufacture pencil leads; a calcined lead of graphite and binder, having its interstices filled with a grease-wetting and penetrating agent, capable of effecting an effective bond with respect to a water soluble glue. No. 2,116,187. Isidor Chesler, West Orange, N. J., to Eagle Pencil Co., corp. of Del.

Method decorating polished wood and other surfaces; applying a design in printing colors to a cellulose derivative foil. No. 2,116,205. Hans Kaufmann, Berlin-Charlottenburg, Germany.

Preparation grease, comprising a fatty acid, glycerides and petroleum hydrocarbons. No. 2,116,209. James McKee, Media, Pa., to Sun Oil Co., Phila., Pa.

Treatment grease wool. No. 2,116,294. Rudolph James Wig, San Marino, Calif., to California Process Co., Los Angeles, Calif.

Mineral wool composition consisting of silica, alumina, alkaline earth metal oxide and sodium oxide. No. 2,116,303. Harold T. Coss, Somerville, N. J., to Johns-Manville Corp., New York City.

Insoluble ink drier; powder of precipitated hydroxy drying metal salt of naphthenic acid. No. 2,116,321. Arthur Minich, Newark, N. J., to Nuodex Products Co., corp. of New York.

Dry cleaning process for fabrics composed at least in part of cellulose acetate; contacting same with composition comprising a major proportion of 1,1,2-trichlorpropene-1. No. 2,116,437. Arthur A. Levine, Niagara Falls, N. Y., to du Pont, Wilmington, Del.

Solvent for degreasing metal articles; composed of 1,1,2-trichlorpropene-1 in admixture with a chlorinated hydrocarbon. No. 2,116,438. Arthur A. Levine, Niagara Falls, N. Y., to du Pont, Wilmington, Del.

Wetting agents useful for alkaline mercerizing solutions. No. 2,116,583. Ferdinand Munz, Frankfort-on-Main, Germany, to General Aniline Works, Inc., New York City.

Aqueous, liquid composition for treating coal, in form of free-flowing, separate, irregular particles or fragments, to render it clean and dustless and to prevent it from discoloring objects with which it comes in contact. No. 2,116,682. Werner E. Kleinicke, Coalwood, W. Va., and Gloster P. Hevenor, Malba, N. Y., to Johnson-March Corp., New York City.

Production glues, pastes, adhesives, etc., by the alkylation of a starch in presence of an alkali. No. 2,116,867. Oscar R. Kreimeier and Robert W. Maxwell to du Pont, all of Wilmington, Del.

Candle containing P_2S_5 for preservation of green fodder. No. 2,117,058. Robert G. Ferris to Starline, Inc., both of Harvard, Ill.

Lubricant adapted to withstand high pressures, comprising mineral lubricating oil containing ortho-hydroxy diphenyl. No. 2,117,076. Harry T. Bennett and Clare Prather, to Mid-Continent Petroleum Corp., all of Tulsa, Okla.

Method exterminating vermin and their larvae in grain; by packing a metal phosphide in a gas-pervious packing and inserting latter without addition of a reagent into a heap of grain. No. 2,117,158. Werner Freyberg and Walter Haupt to Ernst Freyberg Chemische Fabrik Delitia, all of Delitzsch/Sachsen, Germany.

Method cementing materials, at least one of which is coated with a cellulose derivative cement. No. 2,117,209. Earle C. Pitman, Lincroft, N. J., to du Pont, Wilmington, Del.

Vitreous enamel frit for production of white clouded vitreous enamels for ironware, resulting from melting and grinding of a mixture of silicates, borates, fluorine compounds, and aluminum. No. 2,118,047. Ignaz Kreidl, Vienna, Austria.

Luminescent material comprising a manganese activated beryllium zinc salt of an ortho-acid of an element in the fourth group of the periodic series. No. 2,118,091. Humboldt W. Leverenz, Collingswood, N. J., to Radio Corp. of America, corp. of Del.

Surgical adhesive tape comprising fabric base having a pressure-sensitive adhesive containing rubber attached to one side and a coating of a plasticized nitrocellulose composition on opposite side. No. 2,118,101. Edgar H. Nollau, Wilmington, Del., and Donald A. Rankin, White Plains, N. Y., to du Pont, Wilmington, Del.

Manufacture refractory material; using mixture consisting of boric and aluminum oxides. No. 2,118,143. Raymond C. Benner and Henry N. Baumann, Jr., to Carborundum Co., all of Niagara Falls, N. Y.

Production film-strengthening addition agents for lubricants; first passing chlorine into benzene under reacting conditions. No. 2,118,214. Wm. D. Marsh and Jos. A. Spina, Niagara Falls, N. Y., to Hooker Electrochemical Co., New York City.

Lubricant of high film strength; comprising a mineral lubricating oil and incorporated therein a film-strengthening agent such as is produced by passing chlorine into benzene under reacting conditions. No. 2,118,215. Wm. J. Marsh and Jos. A. Spina, Niagara Falls, N. Y., to Hooker Electrochemical Co., New York City.

High film strength lubricant compositions. Nos. 2,118,216-7. Wm. J. Marsh and Jos. A. Spina, Niagara Falls, N. Y., to Hooker Electrochemical Co., New York City.

Shoe filler compositions; incorporating comminuted, granular body material with a finely divided mineral compound, then with a plastic fusible bonding material. No. 2,118,227. Andrew Thoma, Cambridge, Mass., one-half to No. American Holding Corp. and one-half to Parshad Holding Corp., both of Syracuse, N. Y.

Treatment oil-decolorizing clays, heating same to temperature of at least 1600°F. for a period of 4 to 5 seconds. No. 2,118,310. Harold L. Kauffman, Warren, Pa.

Etching composition; dry-grinding together ammonium bifluoride,

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sodium bifluoride, a soluble fluosilicate, a naphthalene sulfonate, and pulverulent starch, maintaining mass in dry powdered form until ready for use. No. 2,118,386. Carl F. Swinehart, Cleveland, O., to Harshaw Chemical Co., Elyria, O.

Germicide for topical application; containing an aqueous solution of a triphenyl methane dyestuff and a lower alkyl ether of diethylene glycol. No. 2,118,460. Spencer J. Currie, Harnett County, N. C.

Liquid wax polishing composition consisting of a wax, a readily volatile solvent and an acid phthalate alkyl ester. No. 2,118,521. John D. Pickens, Flint, Mich., to du Pont, Wilmington, Del.

Coal Tar Chemicals

Preparation organic nitrogen bases and their salts. No. 2,115,250. Herman A. Bruson to Rohm & Haas Co., both of Phila., Pa.

Production phenolic compounds. No. 2,115,332. Charles G. Grosscup to Sharples Solvents Corp., both of Phila., Pa.

Catalytic hydrogenation of carboxylic acids, their esters and anhydrides. No. 2,116,552. Herrick R. Arnold, Elmhurst, and Wilbur A. Lazier, New Castle County, Del., to du Pont, Wilmington, Del.

Manufacture metal-free phthalocyanine coloring matters; subjecting an o-arylene dicyanide to action of heat in presence of reagent. No. 2,116,-602. Isidor Morris Heilbron, Manchester, Francis Irving, Grangemouth, and Reginald Patrick Linstead, London, England, to Imperial Chemical Industries, Ltd., corp. of Great Britain.

Oven for recovery valuable by-products during production of gas and coke. No. 2,116,641. Walter Reppekus, Essen, Germany, to Koppers Co., Pittsburgh, Pa.

Method avoiding foam difficulties in separation of propane from asphalt; increasing temperature of a propane-asphalt mixture to at least 400° F. during process. No. 2,116,772. Elton B. Tucker, Highlands, Ind., and Ernest W. Thiele, Chicago, to Standard Oil Co., Chicago, Ill.

Production sulfated polyethenoxy-alkyl-arylamines. No. 2,118,089. Arthur Howard Knight and Henry Alfred Piggott, Blackley, Manchester, England, to Imperial Chemical Industries, corp. of Great Britain.

Production and separation of isomeric aminohydroxy anthraquinones. No. 2,118,445. Donald G. Rogers, Ridgewood, N. J., to National Aniline & Chemical Co., New York City.

Preparation mononitroalkylanilines, mononitroalkylacylanilines, and their derivatives. No. 2,118,494. Samuel Coffey and Norman Hulton Haddock, Blackley, Manchester, England, to Imperial Chemical Industries, corp. of Great Britain.

Manufacture alkylanilinemonosulfonic acids. No. 2,118,495. Samuel Coffey and Norman Hulton Haddock, Blackley, Manchester, England, to Imperial Chemical Industries, London, Eng.

Coatings

Lacquer enamel having viscosity of 60 to 110 centipoises at 25° C., containing a solvent mixture and non-volatile ingredients comprising a pigment, nitrostarch, and resin. No. 2,115,020. Richard Karl Hazen, Montclair, N. J., to Egyptian Lacquer Mfg. Co., corp. of N. J.

Apparatus and method coating a strand with flock; first applying coating of liquid adhesive to surface of strand. No. 2,115,079. Samuel C. Lilley, Hamden, and Maltby S. Fowler, New Haven, Conn., to American Mills Co., West Haven, Conn.

Metal article coated with a baked enamel, consisting of the conjoint polymer of vinyl acetate and vinyl chloride, said film being free from orange peel formation, and capable of being bent with the metal without cracking or flaking during forming and configurating operations. No. 2,115,214. Clifford Jay Rolle, Yonkers, N. Y., to Ault & Wiborg Corp., New York City.

Aluminum photographic plate; an aluminum surface provided with a coating of aluminum oxide in combination with a photo-sensitive salt. No. 2,115,339. Ralph Bryant Mason, New Kensington, Pa., to Aluminum Co. of America, Pittsburgh, Pa.

Method facing walls, applying succession of coatings, each consisting of cement and sand mixture, after drying applying coating of a cementitious composition containing cement and a metallic soap, lastly impregnating surface with an insoluble precipitate. No. 2,115,612. James Carruthers Blair-McGuffie, Westminster, Eng.

Composition useful in form of films, filaments and coatings, comprising a prolamine base and amino acid ester as a plasticizer. No. 2,115,716. Donald W. Hansen, Decatur, Ill., to Prolamine Prods., Inc., Dover, Del.

Liquid coating composition comprising zein and a non-volatile, neutral, organic plasticizer incorporated together with a neutral, organic, mutual solvent. No. 2,115,717. Donald W. Hansen, Decatur, Ill., to Prolamine Products Inc., Dover, Del.

Method coating ferrous articles. No. 2,115,749. Michael M. Rubin to Thomas Steel Co. both of Warren, O.

Method coating strip steel. No. 2,115,750. Michael Rubin and Ralph E. Alexander to Thomas Steel Co., all of Warren, O.

Bituminous coating composition; mixing gilsonite with a soluble rosin-drying oil modified polyhydric alcohol-polybasic acid resin. No. 2,115,775. James Karr Hunt and Joseph Harrel Shipp to du Pont, all of Wilmington, Del.

Resinous liquid coating composition for waterproofing paper, fabrics and regenerated cellulose. No. 2,115,797. Maurice Henri Belloc to Societe Nobel Francaise, both of Paris, France.

Electron emitting cathode; coating composition; highly refractive compound of an electronically active metal, a carbonaceous substance, and a compound of a stable refractory metal. No. 2,115,828. Charles H. Prescott, Jr., East Orange, N. J., to Bell Telephone Labs., New York City.

Strip of abrasive coated fabric. No. 2,115,904. Robert C. Bryant to Carborundum Co., both of Niagara Falls, N. Y.

Gasket coating composed of foil and digested elaterite. No. 2,116,000. Ruben O. Peterson, Glen Ellyn, Ill., to Victor Mfg. & Gasket Co., Chicago, Ill.

Coating an organic base sheet; applying solution of rubber carrying a phthalic-anhydride-glycerin condensation product, then applying solution of a cellulose ester including a softener. No. 2,116,065. John L. Elliot, to International Printing Ink Corp., both of N. Y. C.

Coated material including a cellulosic base material; coating being rubber carrying a resinous material, a plasticizer; a cover coating including a cellulose ester, a resinous material, and plasticizer. No. 2,116,066. John L. Elliot, Dallas, Tex., to International Printing Ink Corp., New York City.

Moistureproof, non-fibrous wrapping sheet which remains flexible at low temperatures; having base of regenerated cellulose and a moistureproof coating composed of paraffin wax and a high-molecular weight product of the low temperature polymerization of isobutylene. No. 2,116,184. Edward B. Beale, Winnetka, Ill., to Standard Oil Co., Chicago, Ill.

Coating for smoking pipes, etc.; consisting of nitrocellulose and urea resin. No. 2,116,186. Andrew Buschman, Garden City, N. Y.

In preparation of electrical coils, the step of applying mixture of monomeric and polymeric methacrylate esters to coils. No. 2,116,318. John B. Miles, Jr., to du Pont, both of Wilmington, Del.

Adhesive material and covering structure having an adhesive coating; adhesive material composed of mixture of an organic binder and plastic or semi-plastic clayey material and sufficient water to render mixture spreadable. No. 2,116,341. William B. Coleman, Bloomfield, N. J., to Congoleum-Nairn, Inc., corp. of New York.

Preservation butterflies; using a clear lacquer and a compound composed of gum arabic, gum acacia, gelatin, glycerin, salicylic acid and water. No. 2,116,752. Karl Deubel, Jersey City, N. J.

Glass envelope for discharge lamps, having its inner surface coated with sharp-edged particles of diatomaceous earth saturated with zinc oxide and having less than 1% of an activating agent uniformly distributed therethrough. No. 2,116,977. Clemens A. Laise, Tenafly, N. J.

Production colorless protective coating on an aluminum surface; treating same with solution containing an alkali metal oxalate and an alkali metal aluminate. No. 2,118,053. James W. Newsome, New Kensington, Pa., to Aluminum Co. of America, Pittsburgh, Pa.

Production colorless protective coating on an aluminum surface; treating same with solution containing an alkali metal salt of an organic hydroxy acid and an alkali metal aluminate. No. 2,118,055. James W. Newsome, New Kensington, Pa., to Aluminum Co. of America, Pittsburgh, Pa.

Coating composition; blue pigment composition free from reddish cast, comprising iron ferrocyanide blue, zinc oxide, and a brown vegetable oil. No. 2,118,511. Robt. T. Hucks, South River, N. J., to du Pont, Wilmington, Del.

Dyes, Stains, etc.

Materials for accelerated diazo printing. No. 20,708. Reissue. Walker M. Hinman, Winnetka, Ill., to Frederick Post Co., Chicago, Ill.

Production azo compounds. No. 2,115,030. James G. McNally and Joseph B. Dickey to Eastman Kodak Co., all of Rochester, N. Y.

Dyeing process. No. 2,115,136. Harold Blackshaw, Richard Walter Hardacre, and Wilfred Archibald Sexton, Blackley, Manchester, England, to Imperial Chemical Industries, corp. of Great Britain.

Manufacture and application of azo dyes. No. 2,115,149. Kenneth Herbert Saunders, Blackley, Manchester, Eng., to Imperial Chemical Industries, corp. of Great Britain.

Preparation dyestuffs of the oxazine series. No. 2,115,311. Georg Kranzlein, Heinrich Greune, and Max Thiele, Frankfort-on-Main, Germany, to General Aniline Works, New York City.

Compositions containing a vat dyestuff liable to damage cellulosic textile fibers during dyeing and an aromatic hydroxy compound capable of exercising an anti-oxidizing action during dyeing process. No. 2,115,317. Karl Ott, Pavolding, and Otto Storb, Leverkusen-I.G. Werk, Germany, to General Aniline Works, New York City.

Photograph color-forming compounds. No. 2,115,394. Leopold D. Mannes, Leopold Godowsky, Jr., and Willard D. Peterson to Eastman Kodak Co., all of Rochester, N. Y.

Production reddish yellow insoluble monoazo dyes. No. 2,115,412. Miles Augustinus Dahlen and Newell Meade Bigelow, Wilmington, and Frithjof Zwilgmeyer, Arden, Del., to du Pont, Wilmington, Del.

Vat dyestuffs of the anthraquinone series. No. 2,115,446. Karl Koeberle and Joachim Mueller, Ludwigshafen-on-Rhine, Germany, to General Aniline Works, New York City.

Production compounds of the azabenzanthrone series. No. 2,115,445. Karl Koeberle and Otto Schlichting, Ludwigshafen-on-Rhine, Germany, to General Aniline Works, New York City.

Preparation dyestuff sulfonic acids of the dioxazine series. No. 2,155,-508. Heinrich Greune and Max Thiele, Frankfort-on-Main, Germany, to General Aniline Works, New York City.

Production azo dyes. No. 2,115,852. Chester W. Hannum and Swanie S. Rossander, to du Pont, all of Wilmington, Del.

Preparation diazo salt preparations. No. 2,116,131. Max Wyler, Blackley, Manchester, Eng., to Imperial Chemical Industries, Ltd., corp. of Great Britain.

Production polyazo dyestuffs. No. 2,116,206. Hans Krzikalla and Bernd Eistert, Ludwigshafen-on-Rhine, Germany, to General Aniline Works, Inc., New York City.

Production diazo dyestuffs. No. 2,116,355. Georges Kopp, Rouen, France, to Compagnie Nationale de Matieres Colorantes et Manufactures de Produits Chimiques du Nord Reunies, Establissements Kuhlmann, Paris, France.

Process dyeing wool textiles with insoluble dyeings from dyes of the group of indigo, lactam and chrome. No. 2,116,553. Alfred William Baldwin, Harold Blackshaw, and Clarence Sydney Woolvin, Blackley, England, to Imperial Chemical Industries, Ltd., corp. of Great Britain.

Production heavy metal azomethane diarylene dihydroxylates. No. 2,-116,913. Karl Schmidt, Cologne-Mulheim, and Ottmar Wahl, Leverkusen, Germany, to General Aniline Works, New York City.

Production monoazo dyestuffs. No. 2,118,088. Arthur Howard Knight and Henry Alfred Piggott, Blackley, Manchester, England, to Imperial Chemical Industries, corp. of Great Britain.

Manufacture dyestuffs of the group consisting of the dibenzanthrone and isodibenzanthrone series. No. 2,118,192. Robert Grether, Wilhelmsbad, near Hanau-am-Main, Germany, to General Aniline Works, New York City.

Coloring materials; dissolving pigment-forming reagents in a water-miscible organic solvent and applying to material to be colored. No. 2,118,431. Albert E. Gessler, Ardsley-on-Hudson, N. Y., to Interchemical Corp., corp. of Ohio.

Coloring composition composed of a solution of a basic dye and a lake-forming precipitant in an ether of a glycol. No. 2,118,432. Albert E. Gessler to Interchemical Corp., both of New York City.

Manufacture alkylated aniline compounds carrying as nuclear substituents alkyl radicals having 10 to 18 carbon atoms. No. 2,118,493. Samuel Coffey and Norman Hulton Haddock, Blackley, Manchester, England, to Imperial Chemical Industries, corp. of Great Britain.

Explosives

A delay non-tracing igniter mixture for tracer ammunition; being a resinate of an alkaline earth metal, a peroxide of an alkaline earth metal, and a metallic fuel. No. 2,115,047. Thomas Stevenson and Ernest R. Rechel, Phila., Pa.

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Ignition composition made from a basic heavy metallic salt derivative of alpha-trinitro-phenyl-nitramino-isobutyric acid. No. 2,115,066. William F. Filbert, Woodbury, N. J., to du Pont, Wilmington, Del.
Priming composition containing a lead salt of 3-5 dinitro ortho cresol. No. 20,718. Reissue. Willi Brun, Bridgeport, Conn., to Remington Arms Co., corp. of Del.
Priming composition of normal lead dinitro-resorcinate. No. 2,116,514. George C. Hale and William H. Rinkenbach, Dover, N. J.
Priming mixture containing lead nitrato-hypophosphite and an explosive ingredient. No. 2,116,878. Willi Brun and James E. Burns, Bridgeport, Conn., to Remington Arms Co., corp. of Del.
Free-running, water-resistant dynamite; being comminuted gelatin dynamite. No. 2,117,173. Norman G. Johnson, Wenonah, N. J., to du Pont, Wilmington, Del.
Ignition composition; a lead salt of the nitrated product of diphenylol propane. No. 2,118,501. Wm. F. Filbert and Walter E. Lawson, Woodbury, N. J., to du Pont, Wilmington, Del.

Fine Chemicals

Production isolated pure glyoxal-semi-acetals. No. 2,116,016. Hermann Fischer, Basel, Switzerland.
Production molecular compounds, containing carbamide and saccharose as components. No. 2,116,640. Kurt Quehl to Chemische Fabrik Theod. Rotta, both of Zwickau, Germany.
Preparation a phenylmercury salt of succinic acid. No. 2,118,033. Carl N. Andersen, Wellesley Hills, Mass., to Lever Bros., corp. of Me.
Photographic element comprising support carrying an emulsion layer and an antistatic layer containing a higher fatty alcohol sulfate containing no carboxylic acid salt group. No. 2,118,059. Alfred D. Slack and Albert A. Young, Rochester, N. Y., to Eastman Kodak Co., Jersey City, N. J.
New organic mercury compound of the general formula $(RHg)_2.R_1$. No. 2,118,133. Carl N. Andersen, Watertown, Mass., to Lever Bros., corp. of Me.
Preparation hydroxyhydroquinone; subjecting a hydroxyhydroquinone lower fatty acid triester to hydrolysis in presence of acetic acid catalyst. No. 2,118,141. Frederic R. Bean to Eastman Kodak Co., both of Rochester, N. Y.

Glass and Ceramics

Laminated glass; sheet of glass and bonded thereto, a plastic sheet comprising cellulose acetate and dimethyl phthalate. No. 2,115,514. Bozetech C. Bren, Verona, N. J., to du Pont, Wilmington, Del.
Preparation glass batches for clear, transparent glass, by first determining amount of carbon present in batch as dirt, dust, etc., then adding sufficient carbon to bring total to desired percentage. No. 2,116,623. Francis C. Flint, Zanesville, Ohio, to Hazel-Atlas Co., Wheeling, W. Va.

Industrial Chemicals, etc.

Halogen containing rubber derivatives; material comprising a rubber hydrohalide and a metallic sulfide. No. 2,115,053. Herbert A. Winkelmann to Marbon Corp., both of Chicago, Ill.
Composition of matter comprising a rubber hydrochloride and an alkali metal phosphate. No. 2,115,054. Herbert A. Winkelmann to Marbon Corp., both of Chicago, Ill.
Composition comprising intimate mixture of a rubber hydrochloride, litharge, and magnesium oxide. No. 2,115,055. Herbert A. Winkelmann to Marbon Corp., both of Chicago, Ill.
Manufacture high lead concentration plumbite solution; dissolving litharge in caustic soda in presence of metallic antimony. No. 2,115,063. Joseph E. Drapeau, Jr., Hammond, Ind., to Glidden Co., Cleveland, O.
Stable, watery emulsion of a phosphatide and a water soluble lower aliphatic acid. No. 2,115,088. Albert Schwieger, Hamburg, Germany, to American Lecithin Co., Cleveland, O.
Production on an industrial scale of concentrated sulfuric acid from impure, lean sulfur-bearing gases containing water with a water-insensitive catalyst. No. 2,115,091. Conway Baron von Girsewald, Wolfhart Siecke and Max Wohlwill, Frankfort-on-Main, Germany, to American Lurgi Corp., New York City.
Manufacture starch from corn. Nos. 2,115,170-1. Alfred H. Kelling, Oak Park, Ill., to International Patents Development Co., Wilmington, Del.
Catalytic oxidation of nitric oxide. No. 2,115,173. William C. Klingelhoefer, Syracuse, N. Y., to Solvay Process Co., New York City.
Preparation aryloxy polyalkylene ether sulfonates. No. 2,155,192. Herman A. Bruson to Rohm & Haas Co., both of Phila., Pa.
Process causing production of peroxides by the irradiated auto-oxidation of pure alcohols free from water. No. 2,115,206. Nicholas A. Milas, Cambridge, Mass.
Stable peroxides produced by auto-oxidation of secondary butyl alcohol during irradiation of the alcohol by ultra-violet radiations. No. 2,115,207. Nicholas A. Milas, Belmont, Mass.
Preparation acyl aryl compounds. No. 2,115,413. Miles Augustinus Dahlen and Newell Meade Bigelow, Wilmington, and Frithjof Zwilgmeyer, Arden, Del., to du Pont, Wilmington, Del.
Purification crude methanol obtained synthetically by the catalytic hydrogenation of carbon oxides under elevated pressure. No. 2,115,553. Johann Giesen, Helmut Hanisch, and Martin Dally, Leuna, Germany, to I. G., Frankfort-on-Main, Germany.
Process refining soya bean oil, first mixing with same a saturated aqueous solution of trisodium phosphate. No. 2,115,668. Edward M. James, Moylan, Pa., to Sharples Specialty Co., Phila., Pa.
Production anhydrous borax, first melting and dehydrating borax decahydrate by heat to produce molten anhydrous borax glass. No. 2,115,771. Henry D. Hellmers, Westend, Calif.
Treatment metallic sulfides to recover sulfur and metallic oxides. No. 2,115,780. Ivan Roy McHaffie, Montreal, Que., Canada, and Daniel Tyrer, Norton-on-Tees, England, to Imperial Chemical Industries, Ltd., corp. of Great Britain.
Improved process treating sulfate cellulosic pulp contained in a digester. No. 2,115,835. Daniel J. Young to Young-Whitwell Gas Process Co., both of Tacoma, Wash.
Production solid ammonium nitrate in predetermined size particles. No. 2,115,851. Stanley L. Handforth and Kenneth C. Simon, Woodbury, N. J., to du Pont, Wilmington, Del.
Production potassium nitrate from potassium sulfate and mixtures containing same, using nitric acid. No. 2,115,857. Oscar Kaselitz, Berlin, Germany.
Process hydrating an aliphatic ether; reacting in vapor phase an aliphatic ether and water vapor in presence of a catalyst consisting of alumina activated by treatment with aluminum sulfate. No. 2,115,874. Charles W. Rehm, Charleston, W. Va., to Union Carbide & Carbon Corp., corp. of New York.
Alkylation of organic compounds and the isomerization and conversion of alkyl compounds. No. 2,115,884. Karl Schollkopf to Rheinische Kampfer-Fabrik G. m.b.H., both of Dusseldorf-Oberkassel, Germany.
Preparation hexoic acids; oxidizing a hexaldehyde in presence of a soluble compound of copper as the sole catalyst material. No. 2,115,892. Walter J. Toussaint, Charleston, W. Va., to Union Carbide & Carbon Corp., corp. of New York.
Manufacture a glycol di-ester; heating an alkylene dichloride with an alkali metal salt of a lower fatty acid in presence of water. No. 2,115,905. Gerald H. Coleman and Garnett V. Moore to Dow Chemical Co., all of Midland, Mich.
Composition for cleaning molds used for making glassware, being solution of stannous chloride and water acidulated with tartaric acid. No. 2,116,034. Carver N. McGaughey, Clarksburg, W. Va.
Purification organically polluted liquids; first passing liquid through bed of scrap iron, introducing chlorine and diffused air to pass through bed of iron to form ferric chloride in situ, thereafter treating resultant liquid with hydrated lime. No. 2,116,053. Oliver M. Urbain and William R. Stemen, Columbus, O., to Charles H. Lewis, Harpster, Ohio.
Method hardening drying oil; condensing mixture in which condensation reactants consist of oxidized drying oil having double bonds in conjugate arrangement and an unsaturated hydrocarbon terpene at superatmospheric temperature. No. 2,116,072. Walter J. Koenig to Sloane-Blabon Corp., both of Phila., Pa.
Method hardening drying oil; condensing at superatmospheric temperature mixture in which condensation products consist of oxidized drying oil having double bonds in conjugate arrangement and a cyclic organic compound. No. 2,116,073. Walter J. Koenig to Sloane-Blabon Corp., both of Phila., Pa.
Apparatus for electrolytic production of chromic acid and caustic alkali. No. 2,116,138. John W. Boss to Chromium Products Corp., both of Livingston, Mont.
Production aliphatic mercaptans; treating an aliphatic alcohol containing at least 12 carbon atoms per molecule with hydrogen sulfide in presence of a catalyst capable of splitting off water. No. 2,116,182. Karl Baur, Ludwigshafen-on-Rhine, Germany, to I. G., Franfort-on-Main, Germany.
Method of producing from waste sulfite lye a thickly liquid water solution of an adhesive substance. No. 2,116,227. Karl Borje Winlof, Stockholm, Sweden.
Preparation alpha-salicylo-aliphatic acid esters; reacting an alpha-bromo-aliphatic acid ester with an alkali-metal salicylate. No. 2,116,347. Ernest F. Grether and Russell B. Du Vall to Dow Chemical Co., all of Midland, Mich.
Production granules of interlocking crystals of an alkali metal silicate hydrate and sodium carbonate in a dry, non-caking, free-flowing state. No. 2,116,423. Chester L. Baker to Phila. Quartz Co. of Calif., Ltd., both of Berkeley, Calif.
Preparation cyclohexane oxide from the cyclohexane chlorhydrin content of a mixture of cyclohexene chlorhydrin and cyclohexane. No. 2,116,439. Arthur A. Levine and Oliver W. Cass, Niagara Falls, N. Y., to du Pont, Wilmington, Del.
Process removing carbides and other impurities from slag. No. 2,116,469. Ernst Karwat, Grosshesselohe, near Munich, Germany, to Union Carbide & Carbon Corp., corp. of New York.
Process reacting an aliphatic nitrile containing at least 10 carbon atoms with phosphorus pentasulfide. No. 2,116,472. Anderson W. Ralston to Armour & Co., both of Chicago, Ill.
Manufacture of a lower fatty acid anhydride. No. 2,116,656. Henry Dreyfus, London, Eng.
Manufacture of a lower aliphatic anhydride; subjecting vapor of an unsaturated alcohol ester of the corresponding acid to decomposition solely by heat. No. 2,116,657. Henry Dreyfus, London, Eng.
Recovery polyhydric alcohols; separating the constituents of liquor obtained by reduction of sugars and containing at least one polyhydric alcohol having more than four hydroxyl groups. No. 2,116,665. Kenneth R. Brown, Tamaqua, Pa., to Atlas Powder Co., Wilmington, Del.
Electric discharge device having gaseous atmosphere therein, comprising cadmium vapor, and container comprising an ultra violet ray transmitting glass chemically stable in presence of said vapor, consisting of silica, alumina, and calcium oxide. No. 2,116,742. Willem Elenbaas and Gottfried Bruno Jonas, Eindhoven, Netherlands, to General Electric Co.
Production soluble formaldehyde concentrates; concentrating an acid formaldehyde solution containing less than 0.03% formic acid. No. 2,116,783. Hermann Finkenbeiner, Constance, and Wendelin Schmache, Buchschiag, Germany, to Deutsche Gold- und Silber-Scheideanstalt, vormals Roessler, Frankfort-on-Main, Germany.
Production polyhydroxy leuco derivatives of triphenylmethane. No. 2,116,827. Zoltan Foldi, Budapest, Hungary.
Production carbon black; heating nitrogen above decomposition temperatures of hydrocarbons, then introducing latter into nitrogen and carrying out dissociation at decreasing temperatures to produce carbon. No. 2,116,848. Forrest C. Reed to Le Roy J. Snyder, both of Kansas City, Mo.
Cyclical process for synthesis of urea, by heating ammonia and carbon dioxide at urea-forming temperatures and pressures in presence of an excess of ammonia over the stoichiometrical requirements. No. 2,116,881. Harold W. de Ropp to du Pont, both of Wilmington, Del.
Production mixed anhydrous naphthenates of heavy metals. No. 2,116,884. Gerald M. Fisher, Los Angeles, Calif., to Socony-Vacuum Oil Co., New York City.
Process chlorinating and brominating carbonyl compounds, first introducing a halogen of the group of chlorine and bromine into ketones capable of being halogenated in alpha-position. No. 2,116,893. Paul Heisel, Gersthofen, near Augsburg, Germany, to I. G., Frankfort-on-Main, Germany.
Production hydrogen; decomposing hydrocarbons at high temperatures. No. 2,116,993. Dwight C. Bardwell, Syracuse, N. Y., and Frank Porter, Prince George County, Va., to Solvay Process Co., New York City.
Copper-oxide rectifier. No. 2,117,020. Frank Conrad, Wilkinsburg, Pa., to Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Method of and apparatus for producing CO_2. No. 2,117,025. Franklin B. Hunt, Jabez H. Pratt, Henry S. Tirell, and Robert L. Turner to Liquid Carbonic Corp., all of Chicago, Ill.
Manufacture a mercapto arylene thiazole of the benzene and naphthalene series; discharging the molten mercapto arylene thiazole into a

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dilute water solution of an acid. No. 2,117,120. Claude H. Smith, Tallmadge, and Carl W. Gay, Akron, Ohio, to Wingfoot Corp., Akron, Ohio.

Production zinc sulfide precipitate. No. 2,117,205. Arne J. Myhren, Palmerton, Pa., to New Jersey Zinc Co., New York City.

Production amino acids. No. 2,117,207. Ludwig Orthner, to I. G., both of Frankfort-on-Main, Germany.

Recovery oils or fats from spent bleaching clay. No. 2,117,223. Edward M. Slocum, Macon, Ga.

Production isopropyl alcohol in a continuous manner. No. 20,738. Reissue. Floyd J. Metzger to Air Reduction Co., both of New York City.

Production ethyl alcohol in a continuous manner, using an aqueous phosphoric acid catalyst in process. No. 20,739. Floyd J. Metzger to Air Reduction Co., both of New York City.

Method extracting sulfur from sulfur-containing materials. No. 2,118,-140. Robert W. Beattie, Bloomfield, N. J., to Halowax Corp., New York City.

Recovery iron sulfate from waste liquor containing ferrous sulfate in aqueous solution. No. 2,118,272. Elias Anthon Cappelen Smith to Guggenheim Bros., both of New York City.

Production a thiocarbanilid derivative; dissolving thiocarbanilid in sulfuric acid at normal temperatures and precipitating derivative by means of water. No. 2,118,293. Frederic A. Brinker, Denver, Colo.

Manufacture sulfuric acid by contact process. No. 2,118,333. Ferd W. Wieder, Berkeley, Calif., to Stauffer Chemical Co., corp. of Calif.

Process for obtaining magnesium oxide from dolomite rock. No. 2,-118,353. Walter H. MacIntire, Knoxville, Tenn., to American Zinc, Lead & Smelting Co., St. Louis, Mo.

Preparation polyvinyl nitrate; treating polyvinyl alcohol with strong nitric acid under conditions unfavorable to oxidation. No. 2,118,487. Lawrence A. Burrows, Wenonah, and Wm. F. Filbert, Woodbury, N. J., to du Pont, Wilmington, Del.

Preparation carboxylic acid ester of a long chain alkyl ether of a dihydric alcohol. No. 2,118,506. Geo. D. Graves to du Pont, both of Wilmington, Del.

Leather

Method fat-liquoring, filling or stuffing hides, skins, leather; introducing into same a low vapor pressure ester of an organic carboxylic acid. No. 2,115,509. Alphons O. Jaeger, Mount Lebanon, Pa., to American Cyanamid & Chemical Corp., New York City.

Tanning process; treating skins or leather with oxalic acid solutions of water-insoluble phosphates of metals. No. 2,115,880. Otto Rohm, Darmstadt, Germany.

Method tanning skins by the alum process. No. 2,115,562. August C. Orthmann, Milwaukee, Wis.

Method fat-liquoring, filling or stuffing hides, skins, and leather; introducing into same a water-insoluble plasticizer containing a polyhydric alcohol ester of an organic carboxylic acid. No. 2,118,308. Alphons O. Jaeger, Mt. Lebanon, Pa., to American Cyanamid & Chemical Corp., New York City.

Metals, Alloys, Ores

Method removing from chromium alloy steel the mill scale formed during production and fabrication, by electrochemical treatment. No. 2,115,005. Samuel J. Blaut, Mount Vernon, and Harold M. Lang, New York City.

Production malleable and annealable nickel by direct electrolysis. No. 2,115,019. Anton Martin Gronningsaeter, Crestwood, N. Y., to Falconbridge Nickel Mines, Ltd., Toronto, Ont., Canada.

Process removing metals from lead alloys; using flux consisting of a mixture of lead fluoride and lead oxide. No. 2,115,299. William Thomas Butcher, Ilford, Eng., to Goodlass Wall & Lead Industries, London, Eng.

Treatment lead; reacting upon a bath containing lead with a flux, latter consisting of mixture of a lead halide and a sulfide of a metal A having less affinity for sulfur than a metal B in the bath. No. 2,115,300. William Thomas Butcher, Ilford, Eng., to Goodlass Wall & Lead Industries, Ltd., London, Eng.

Alloy composed of chromium, nickel, molybdenum, cobalt, carbon, and iron. No. 2,115,732. Vsevolod Nicholas Krivobok, Pittsburgh, Pa., to Rustless Iron & Steel Corp., Balto., Md.

Alloy composed of chromium, nickel, cobalt, molybdenum, manganese, carbon, and iron. No. 2,115,733. Vsevolod Nicholas Krivobok, Pittsburgh, Pa., to Rustless Iron and Steel Corp., Balto., Md.

Electrode element for a vacuum tube, comprising a precipitation hardening alloy consisting of titanium, magnesium, carbon, and nickel. No. 2,115,759. Francis E. Bash, Morristown, N. J., to Driver-Harris Co., Harrison, N. J.

Method separating lead and cadmium from zinc ores. No. 2,116,203. Reed W. Hyde, Summit, N. J., to Dwight & Lloyd Sintering Co., Inc., New York City.

Method casting sweat-free copper cakes; pouring molten copper into a mold provided with a bone ash mold dressing. No. 2,116,207. Karl A. Lindner, Balto., Md., and Frank F. Poland, Highland Park, N. J., to American Smelting & Refining Co., New York City.

Method smelting metals; using molten bath of metal having slag thereon. No. 2,116,219. Gilbert E. Seil, Cynwyd, Pa.

Preparation metallic magnesium; heating magnesium oxide with an aluminum-magnesium alloy and condensing metal vapor given off. No. 2,116,245. Gustaf Newton Kirsebom, Clifton, Bristol, England, to Calloy, Ltd., London, Eng.

Electrically conductive alloy resisting mechanical wear and oxidation, consisting of cadmium, boron, and copper. No. 2,116,252. Hans Heinrich Schwarzkopf, Reutte, Austria, to N. V. Molybdenum Corp., Amsterdam, Netherlands.

Process impregnating copper into a mass or article containing iron; mixing calcium nitrate and glycerin with copper before heating. No. 2,116,271. Frank Leverick, Blaby, near Leicester, Eng., to Follsain Syndicate, Ltd., London, Eng.

Production aluminum alloy composed of magnesium, zinc, copper, iron, silicon, manganese, and aluminum. No. 2,116,273. Yonosuke Matuenaga, Naka-ku, Yokohama, Japan.

Production aluminum alloy composed of magnesium, zinc, nickel, iron, silicon, manganese, and aluminum. No. 2,116,274. Yonosuke Matuenaga, Naka-ku, Yokohama, Japan.

Production aluminum alloy composed of magnesium, zinc, copper, nickel, iron, silicon, manganese, and aluminum. No. 2,116,275. Yonosuke Matuenaga, Naka-ku, Yokohama, Japan.

Production shaped bodies of an extremely hard substance with a high degree of resistance to wear and of tenacity, made from carbides, nitrides, silicides, borides, boron and easily fusible auxiliary metals. No. 2,116,399. Paul Marth, Dusseldorf, Germany.

Sintered, hard substance alloy of pulverized metal carbides, nitrides, silicides, or borides and auxiliary metals. No. 2,116,400. Paul Marth, Dusseldorf, Germany.

Magnetic alloy composed of nickel, iron, molybdenum, chromium, and tin. No. 2,116,401. Yoshiji Matsuyama, Shukichi Kuno, and Shigeji Nasu, Tokyo, Japan, to General Electric Co., corp. of New York.

Impregnation of metals with silicon. No. 20,719. Reissue. Harry K. Ihrig to Globe Steel Tubes Co., both of Milwaukee, Wis.

Conversion finely divided lead ores into lump form for metallurgical treatment on the ore hearth. No. 2,116,679. Kurt Rudolf Gohre, Frankfort-on-Main, Germany, to American Lurgi Corp., New York City.

Froth flotation of non-sulfide ores wherein aqueous suspension of ore is agitated and aerated in presence of a pre-emulsified mineral oil flotation agent. No. 2,116,727. Samuel Lenher and Joseph Lincoln Gillson to du Pont, all of Wilmington, Del.

Bearing alloy consisting of silver, antimony, and cadmium. No. 2,116,-851. Julian G. Ryan, Wood River, Ill., to Shell Development Co., San Francisco, Calif.

Production solder and terne metals from non-metallic scraps and wastes, using alkali metals and caustic alkali in process. No. 2,116,891. Albert Hanak, Phila., Pa.

Process heat-treating alloys made from silicon, calcium, nickel and copper. No. 2,116, 923. John W. Bolton, to Lunkenheimer Co., both of Cincinnati, Ohio.

Brazed article, plurality of metal parts at least one of which is composed of a copper base alloy. No. 2,117,106. Horace F. Silliman, to American Brass Co., both of Waterbury, Conn.

Alloy highly resistant to oxidation, containing iron and a non-ferruginous disembrittling metal combined with phosphorus. No. 2,117,191. Roy B. McCauley, Chicago Heights, Ill.

Alloy comprising chromium, phosphorus, silicon, and iron. No. 2,117,-263. Marvin J. Udy, Niagara Falls, N. Y., to Monsanto Chemical Co., corp. of Del.

Permanent magnets consisting of finely divided magnetic metal alloys. No. 2,118,285. Wilhelm Zumbusch to Deutsche Edelstahlwerke Aktiengesellschaft, both of Krefeld, Germany.

Electrolytically depositing iron; electroplating through a heated solution of ferrous sulfate containing hydrofluoric acid and sodium fluoride. No. 2,118,395. Wm. Arthur Crowder to Pyrene Mfg. Co., both of Newark, N. J.

Naval Stores

Method purifying rosin, first treating rosin in solution in a hydrocarbon solvent. No. 2,115,490. Irvin W. Humphrey, to Hercules Powder Co., both of Wilmington, Del.

Condensation product formed by reaction of a pine wood pitch. No. 2,115,496. Cornelis Maters, The Hague, Netherlands, to Hercules Powder Co., Wilmington, Del.

Method refining rosin by extraction of color bodies therefrom. No. 2,115,679. Leavitt N. Bent, Holly Oak, Del., to Hercules Powder Co., Wilmington, Del.

Paper and Pulp

Manufacture paper filled with alkaline filler. No. 2,115,747. Harold Robert Rafton, Andover, Mass., to Raffold Process Corp., corp. of Mass.

Method of and apparatus for forming a pulp web. No. 2,116,168. James Fish, Bristol, Pa., and Arnold John Barea, Berlin, N. H., to Brown Co., Berlin, N. H.

Paper stock deinking method, subjecting same to an alkaline treatment. No. 2,116,511. Theodore Earle, Denver, Colo.

Method enhancing wet strength of papers; impregnating fibrous base with aqueous albuminous binder composition and drying. No. 2,116,544. Milton O. Schur, to Brown Co., both of Berlin, N. H.

Method preparing paper pulp sizing solution containing acid precipitable colloidal particles of rosin; adding to a dilute aqueous solution of alkali resinate soya bean casein. No. 2,116,768. Ben W. Rowland, to Institute of Paper Chemistry, both of Appleton, Wis.

Moistureproof coated paper; coating comprising a metallic soap, an ester gum, a plasticizer, and a stearic acid wax. No. 2,117,199. Bert C. Miller, Montclair, N. J., to Bert C. Miller, Inc., New York City.

Coated paper, having high gloss; using a synthetic resinous composition. No. 2,117,200. Bert C. Miller, Montclair, N. J., to Bert C. Miller, Inc., New York City.

Rancid-proof wrapping paper; sheet of paper treated with petrolatum, sheet containing groundwood to retard rancidity. No. 2,117,237. George J. Brabender, Wausau, Wis., to Marathon Paper Mills Co., Rothschild, Wis.

Manufacture paper; applying to web an aqueous mix made from ingredients comprising adhesive, pigment and a non-breakable emulsion of paraffin. No. 2,117,256. Harold Robert Rafton, Andover, Mass., to Raffold Process Corp., corp. of Mass.

Preparation moisture-vapor-proof paper; coating one side with wax, coating opposite side with wax only along opposite edges, then coating paper with resinous material between wax coatings. No. 2,118,152. Wm. H. Bryce, Memphis, Tenn., to Dixie Wax Paper Co., Dallas, Tex.

Process and apparatus for coating paper. No. 2,118,212. James D. MacLaurin, So. Orange, N. J.

Petroleum Chemicals

Manufacture oxidized products; decomposing hydrocarbon materials in liquid state. No. 2,112,250. Wm. B. D. Penniman, Balto., Md.

Reducing organic acidity in petroleum oils. No. 2,112,313. Wesley H. Sowers, Swarthmore, Pa., to Pure Oil Co., Chicago, Ill.

Apparatus for treating hydrocarbon fluids. No. 2,112,335. Harry E. Drennan to Phillips Petroleum Co., both of Bartlesville, Okla.

Apparatus for cracking petroleum oil. No. 2,112,360. Carbon P. Dubbs, Newstead, Paget, Bermuda, to Universal Oil Products Co., Chicago, Ill.

Fractional distillation and conversion of hydrocarbon oils. No. 2,112,-376. Jacque C. Morrell to Universal Oil Products Co., both of Chicago, Ill.

Conversion and coking of hydrocarbon oils. No. 2,112,377. Jacque C. Morrell to Universal Oil Products Co., both of Chicago, Ill.

Manufacture catalyst adapted to catalyze reaction between hydrocarbon and steam at temperatures between 900° and 1500° F. No. 2,112,387. Wm. J. Sweeney and Wm. E. Spicer, Baton Rouge, La., to Standard Oil Development Co., corp. of Del.

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Apparatus for testing oil wells. No. 20,688. Reissue. Erle P. Halliburton, Los Angeles, Calif., to Halliburton Oil Well Cementing Co., Duncan, Okla.

Apparatus for locating hydrocarbon deposits in the earth. No. 2,112,845. Lynn G. Howell, Houston, Tex., to Standard Oil Development Co., corp. of Del.

Production gasoline boiling hydrocarbons; alkylating isobutane with isobutylene in presence of aluminum chloride. No. 2,112,846. Vladimir Ipatieff and Herman Pines to Universal Oil Products Co., all of Chicago, Ill.

Production of alkyl derivatives of isobutane; subjecting latter to action of propylene in presence of aluminum chloride and hydrogen chloride. No. 2,112,847. Vladimir Ipatieff and Herman Pines to Universal Oil Products Co., all of Chicago, Ill.

Process dewaxing and decolorizing a previously untreated non-dewaxed and undecolorized residual lubricating oil stock. No. 2,113,008. Claude F. Tears, Warren, Pa., to Petroleum Processes Corp., Wichita, Kans.

Method reactivating adsorbent decolorizing medium, by washing same with methylene chloride. No. 2,113,010. Claude F. Tears, Warren, Pa., to Petroleum Processes Corp., Wichita, Kans.

Catalyst regeneration; polymerizing olefin gases. No. 2,113,028. Ward E. Kuentzel, Whiting, Ind., to Standard Oil Co., Chicago, Ill.

Process fractional distillation. No. 2,113,130. Geo. S. Dunham, Augusta, Kans., to Socony-Vacuum Oil Co., New York City.

Treatment liquid hydrocarbon mixtures to produce a splitting of the hydrocarbons into lower boiling hydrocarbons. No. 2,113,162. Mathias Pier, Heidelberg, Germany, to I. G., Frankfort-am-Main, Germany.

Method of and apparatus for heating petroleum to elevated temperature. No. 2,113,331. Arthur E. Nash, Phila., and James S. Alcorn, Wynnewood, Pa., to Alcorn Combustion Co., Phila., Pa.

Process separating gasoline fraction from cracked gaseous petroleum products containing gases that are lower boiling than said gasoline fraction. No. 2,113,588. Crawford H. Greenewalt to du Pont, both of Wilmington, Del.

Method petroleum distillation. No. 2,113,635. William Tiddy to Semet-Solvay Engineering Corp., both of New York City.

Conversion hydrocarbon oils. No. 2,113,639. Charles H. Angell to Universal Oil Products Co., both of Chicago, Ill.

Apparatus for dewaxing hydrocarbon oils. No. 2,113,809. Bert H. Lincoln to Continental Oil Co., both of Ponca City, Okla.

Treatment hydrocarbon oil; first separating from raw crude oil light and heavy virgin naphtha and topped crude. No. 2,113,816. Charles W. Saacke, New York City, to Gasoline Products Co., Newark, N. J.

Distillation process. No. 2,113,965. Petrus Jurjen Roelfsema, Long Beach, Calif., to Shell Development Co., San Francisco, Calif.

Preparation substitute resin oils which are derived from the by-products of petroleum refining. No. 2,114,126. Arthur Lazar, Associated, Calif., to Tide Water Associated Oil Co., a corp. of Del.

Treatment previously untreated gasoline distillates. No. 20,703. Reissue. Rudolph C. Osterstrom, Kenilworth, Ill., to Pure Oil Co., Chicago, Ill.

Apparatus for converting mineral oil into lower-boiling products. No. 2,114,312. Ralph Monroe Parsons, Amagansett, N. Y., to Houdry Process Corp., Wilmington, Del.

Process chemically treating petroleum hydrocarbon oils and distillates, and light oils and distillates, in liquid phase to obtain products free of gum-forming substances and undesirable sulfur compounds. No. 2,114,313. Walter A. Patrick, Jr., Mount Washington, Md.

Chemical treatment oils and distillates to obtain products free of easily oxidizable or otherwise unstable substances as well as resins or asphaltic materials and sulfur impurities. Nos. 2,114,314-5. Walter A. Patrick, Jr., Mount Washington, Md.

Completely neutralizing sour acid-treated high-boiling petroleum fractions without use of adsorptive, agglomerative, or alkaline materials. No. 2,114,352. Arthur A. Neff, Paulsboro, N. J., to Socony-Vacuum Oil Co., New York City.

Process for complete recovery of ingredients of spent doctor solution. No. 2,114,354. Evert T. Pummill, Augusta, Kans., to Socony-Vacuum Oil Company, New York City.

Pyrolysis of liquid hydrocarbons. No. 2,114,416. Joseph F. Donnelly, Lemont, Ill.

Treatment distillate petroleum product to reduce tendency to deterioration or developing color during storage. No. 2,114,437. Henry G. Berger and Edwin M. Nygaard, Woodbury, N. J., to Socony-Vacuum Oil Co., New York City.

Improved process for separating wax from hydrocarbon oils. No. 2,114,467. Stewart C. Fulton, Elizabeth, and James M. Whiteley, Roselle, N. J., to Standard Oil Development Co., corp. of Del.

Pyrolytic conversion of hydrocarbon oils. No. 2,114,515. Joseph G. Alther to Universal Oil Products Co., both of Chicago, Ill.

Process for cracking of hydrocarbon oils. No. 2,114,516. Charles H. Angell to Universal Oil Products Co., both of Chicago, Ill.

Extraction aromatic components of a hydrocarbon oil. No. 2,114,524. Heinrich Egli, Emmastad, Curacao, Dutch West Indies, to Shell Development Co., San Francisco, Calif.

Conversion and coking of hydrocarbon oils. No. 2,114,533. Lyman C. Huff to Universal Oil Products Co., both of Chicago, Ill.

Thermal decomposition of hydrocarbons. No. 2,114,544. Jean Delattre Seguy to Universal Oil Products Co., both of Chicago, Ill.

Process for breaking petroleum emulsions; treating emulsion with an unoxidized polymerized fatty oil. No. 2,114,651. Ivor M. Colbeth, East Orange, N. J., to Baker Castor Oil Co., New York City.

Treatment hydrocarbon oil. No. 2,114,671. Rodney V. Shankland, Hammond, Ind., and Ralph H. Price, Galveston, Tex., to Standard Oil Company (Ind.), Chicago, Ill.

Production alcohols from naphthenic acid derivatives. No. 2,114,717. Wilbur A. Lazier, New Castle County, Del., to du Pont, Wilmington, Del.

Stabilization aliphatic mixed ethers; composition stabilized against peroxide formation, comprising an aliphatic mixed ether and a stabilizing amount of a phenolic body. No. 2,114,832. Theodore Evans, Berkeley, Calif., to Shell Development Co., San Francisco, Calif.

Process desulfurizing mineral oil distillates. No. 2,114,852. Donald S. McKittrick, Oakland, Calif., to Shell Development Co., San Francisco, Calif.

Treatment petroleum oil to produce motor fuel and coke. No. 2,114,987. Victor Stapleton, Jackson Heights, N. Y., to Texas Co., New York City.

Recovery of solvent in solvent treating processes. No. 2,115,003. Gustav A. Beiswenger, Elizabeth, N. J., to Standard Oil Development Co., corp. of Del.

Method for cracking oils in vapor phase. No. 2,115,144. Percy C. Keith, Jr., Peapack, N. J., to Gasoline Prods. Co., Newark, N. J.

An improved Diesel fuel. No. 2,115,275. Robert C. Moran, Wenonah, and Darwin E. Badertscher, Woodbury, N. J., to Socony-Vacuum Oil Co., New York City.

Process destructively hydrogenating carbonaceous materials such as solid and liquid fuels, using hydrogen in process. No. 2,115,336. Carl Krauch and Mathias Pier, Heidelberg, Germany, to Standard-I.G. Co., Linden, N. J.

Lubricating oil, comprising a viscous hydrocarbon oil containing another product. No. 2,115,341. Louis A. Mikeska and Luther B. Turner, Elizabeth, N. J., to Standard Oil Development Co., corp. of Del.

Blended oil composition; a mineral oil, a polymerized fatty oil, and a monohydric aliphatic alcohol. No. 2,115,354. Jones I. Wasson, Elizabeth, N. J., to Standard Oil Development Co., corp. of Del.

Blended oil containing a condensed oxygen-containing aromatic material containing more than two nuclei per mol. and capable of reducing the Sligh value of an oil. No. 2,115,355. Peter J. Wiezevich, Elizabeth, N. J., now by judicial change of name to Peter J. Gaylor, to Standard Oil Development Co., corp. of Del.

Secondary recovery from oil wells. No. 2,115,378. Harry Comer Wolf, Irvine, Ky., to Arnold R. Hanson and S. Willner Hanson, trustees.

Separating and recovering a solvent from a solution containing same. No. 2,115,401. William H. Shiffler and John Q. Cope, Berkeley, Calif., to Standard Oil Co. of Calif., San Francisco, Calif.

Manufacture a sulfur-bearing oil. No. 2,115,426. Henry F. Merriam, West Orange, N. J., and George W. Cupit, Jr., Long Island City, N. Y., to General Chemical Co., New York City.

Method purifying and desulfurizing liquid motor fuel, consisting of hydrocarbons obtained by coking solid carbonizable fuel and containing sulfur and organic compounds. No. 2,115,549. Hans Broche and Hellmuth Schmitz, Essen, Germany.

Treatment hydrocarbon oil. No. 20,740. Reissue. Edw. E. Stewart, deceased, late of Wichita Falls, Tex., by Universal Oil Products Co., assignee, Chicago, Ill.

Thermal conversion of hydrocarbons. No. 2,118,288. Harold V. Atwell, White Plains, N. Y., to Gasoline Products Co., Newark, N. J.

Recovery vanadium oxides from mineral oils. No. 2,118,351. Hendrik Jan Jakob Janssen, The Hague, Netherlands, to Shell Development Co., San Francisco, Calif.

Separation high molecular mixtures of the ester type. No. 2,118,454. Albert Schaafsma, Amsterdam, Netherlands, to Shell Development Co., San Francisco, Calif.

Hydrocarbon oil conversion. No. 2,115,606. Joseph G. Alther to Universal Oil Products Co., both of Chicago, Ill.

Process decreasing viscosity gravity constant of a viscous mineral oil, first extracting oil with nitrobenzene containing an organic acid anhydride. No. 2,115,704. Eugene R. Brownscombe, Aldan, Pa., to Atlantic Refining Co., Phila., Pa.

Process for restoring deteriorated cracked gasoline containing organic peroxides. No. 2,115,781. Jacque C. Morrell to Universal Oil Prods. Co., both of Chicago, Ill.

Method fractionally distilling hydrocarbon oils or the like. No. 2,115,793. Harry Robert Swanson, White Plains, and John Samuel Wallis, N. Y. City, to Foster Wheeler Corp., N. Y. City.

Conversion hydrocarbon oils. No. 2,115,794. Kenneth Swartwood to Universal Oil Products Co., both of Chicago, Ill.

Preparation an oil emulsion breaking compound; sulfonic acids from SO_3 extract of light mineral oil distillates. No. 2,115,843. Oliver H. Dawson, Baytown, Tex., to Standard Oil Development Co., corp. of Del.

Process obtaining valuable products from petroleum residues. No. 2,115,846. Per K. Frolich, Roselle, N. J., to Standard Oil Development Co., corp. of Del.

Method treating mineral oils. No. 2,115,960. Hans Friedrich Lindeke, Martinez, Calif., to Shell Development Co., San Francisco, Calif.

Purification mineral oils, tars, their distillation products, etc. No. 2,116,061. Eugen Dorrer, Ludwigshafen-on-Rhine, Germany, to Standard-I. G. Co., Linden, N. J.

Production non-knocking motor fuels. No. 2,116,081. Mathias Pier, Heidelberg, and Walter Kroenig, Ludwigshafen-on-Rhine, Germany, to I. G., Frankfort-on-Main, Germany.

Treatment lubricating oil. No. 2,116,144. Henry Randel Dickinson, Grand Rapids, Mich.

Production liquid polymers from ethylene; subjecting ethylene to action of a solid catalyst. No. 2,116,151. Vladimir Ipatieff and Ben B. Corson, to Universal Oil Products Co., all of Chicago, Ill.

Production liquid hydrocarbons from a mixture of 3 and 4 carbon atom olefins and paraffins. No. 2,116,157. Jacque C. Morrell to Universal Oil Products Co., both of Chicago, Ill.

Process extracting hydrocarbon material. No. 2,116,188. Durand Churchill, Jr., New York, N. Y., to Standard Oil Development Co., corp. of Del.

Production phthalocyanine of the benzene series containing acyl groups attached to the benzene nuclei. No. 2,116,196. Sebastian Gassner and Berthold Bienert, Leverkusen I. G.-Werk, Germany, to General Aniline Works, Inc., New York City.

Purification a cracked petroleum hydrocarbon oil, reacting and mixing with the oil a straight run sulfuric acid sludge. No. 2,116,208. Gideon J. Malherbe, Bronxville, N. Y., to De Laval Separator Co., New York City.

Prevention rancid odor in solid paraffin wax during storage; straining wax in molten condition through clay, then incorporating a wax-soluble phenolic compound. No. 2,116,220. Bernard H. Shoemaker, Hammond, Ill., to Standard Oil Co., Chicago, Ill.

Process and apparatus for cooling of fuel atomizers. No. 2,116,337. Johannes Jan Broeze, Delft, and Gerrit van Willigen, The Hague, Netherlands, to Shell Development Co., San Francisco, Calif.

Method purifying oil. No. 2,116,344. Russell P. Dunmire to Buckeye Labs., Inc., both of Alliance, Ohio.

Combined oil cracking and viscosity breaking process. No. 2,116,417. Howard V. Smith, Eldorado, Kans., to Skelly Oil Co., Tulsa, Okla.

Process and apparatus for treating mineral oils. No. 2,116,428. Merrell R. Fenske, State College, Pa., to Pennsylvania Petroleum Research Corp., corp. of Pa.

Process for testing a lubricating oil. No. 2,116,442. Wilbert B. McCluer, State College, Pa., to Pennsylvania Petroleum Research Corp., corp. of Pa.

Extracting a hydrocarbon oil with a selective solvent. No. 2,116,540. Oscar L. Roberts, Merwood Park, Pa., to Atlantic Refining Co., Phila., Pa.

Production special motor fuels of high anti-knock quality and consisting of aliphatic hydrocarbons of branched structure. No. 2,116,723. Frederick E. Frey and Harold J. Hepp, Bartlesville, Okla., to Phillips Petroleum Co., corp. of Del.

Conversion hydrocarbons, using calcium oxide in process. No. 2,116,773. Vanderveer Voorhees, Hammond, Ind., to Standard Oil Co. (Ind.), Chicago, Ill.

Conversion hydrocarbons. No. 2,117,022. Paul L. Cramer, Highland Park, Mich., to General Motors Corp., Detroit, Mich.

U. S. Chemical Patents

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Pigments, Dry Colors and Fillers

Method precipitating lithopone. No. 2,115,039. Kenneth S. Mowlds, Balto., Md., to Glidden Co., Cleveland, Ohio.

Manufacture red pigment; cadmium-selenide red. No. 2,115,080. James J. O'Brien, Dundalk, and Gordon M. Juredine, Balto., Md., to Glidden Co., Cleveland, Ohio.

Production basic carbonate white lead. No. 2,115,090. Edward D. Turnbull, Clarks Summit, Pa., to Glidden Company, Cleveland, Ohio.

Preparation red pigments; preparing crude cadmium sulfo-selenide pigment, heating same at 115 to 450° C. and 1,000 to 40,000 lbs. per sq. in. pressure. No. 2,115,739. Kenneth S. Mowlds, Balto., Md., to Glidden Co., Cleveland, Ohio.

Manufacture jet black lake pigments; forming slurry of carbon black, preparing solution of a soluble black acid dye, mixing slurry into solution, then adding precipitant for the dye. No. 2,118,512. Robt. T. Hucks, South River, N. J., to du Pont, Wilmington, Del.

Resins, Plastics, etc.

Organic plastic composition pigmented with individual, separately distinguishable particles, and which is especially adapted for making dental plates. No. 2,115,034. Karl W. Monroe, Arlington, N. J., to du Pont, Wilmington, Del.

Production synthetic asphalt-like hydrocarbon plastic. No. 2,115,306. William H. Hampton, Orville E. Cushman and Joseph E. Fratis, Berkeley, Calif., to Standard Oil Co., of Calif., San Francisco, Calif.

Method converting solids of milk into a plastic; mixing said solids, including casein and lactose, with a weak acid of about the dissociation value of resin acids, a tanning agent, and an alkaline material. No. 2,115,316. William S. Murray, Utica, N. Y., to Dairymen's League Co-Operative Ass'n, New York City.

Molding composition embodying a thermosetting phenyl-aldehyde resin, a filler, and a diphenyl derivative. No. 2,115,524. Carroll A. Hochwalt and Nicholas N. T. Samaras, Dayton, Ohio, to Monsanto Chemical Co., St. Louis, Mo.

Molding composition comprising cellulose impregnated with a urea-aldehyde resin syrup. No. 2,115,550. Carleton Ellis, Montclair, N. J., to Ellis-Foster Co., corp. of N. J.

Modified oil-soluble phenolic resin, formed from castor oil, a polyhydric alcohol and an unmodified oil-soluble resinous condensation product of a phenol and an aldehyde. No. 2,115,557. Paul E. Marling, Dayton, Ohio, to Monsanto Chemical Co., St. Louis, Mo.

Method decolorizing resins. No. 2,115,564. Charles A. Thomas, Frank J. Soday, and Wallene R. Derby, Dayton, Ohio, to Monsanto Chemical Co., St. Louis, Mo.

Sheet of metal foil having an integrally secured backing comprising coumarone-indene resin polymerized nitrocellulose and refined heavy coal tar. No. 2,115,584. Harvey G. Kittredge and Frank W. Williams to Foilfilm, Inc., all of Dayton, O.

Process resolving water-in-oil emulsions; adding thereto a highly colloidal complex condensation product of the modified synthetic resin type. No. 20,717. Reissue. Truman B. Wayne, Houston, Tex.

Preparation esters of polyglycols and their ethers and compositions. No. 2,115,700. Bjorn Andersen, Maplewood, and Amerigo F. Caprio, Newark, N. J., to Celluloid Corp., corp. of N. J.

Production esters of polycarboxylic acids, containing at least one acylated methylene glycol residue linked as an alcohol radicle to the acid radicle. No. 2,115,709. Henry Dreyfus, London, Eng.

Production compositions and articles containing organic derivatives of cellulose and esters of polycarboxylic acids. No. 2,115,710. Henry Dreyfus, London, Eng.

Preparation plasticized rubber substitutes; using a vinyl compound and a plasticizer. No. 2,115,896. Peter J. Wiezevich, now by judicial change of name Peter J. Gaylor, Elizabeth, N. J., to Standard Oil Development Co., corp. of Del.

Abrasive article, comprising a flexible band, a plurality of blocks of bonded abrasive material attached to band by a resin layer. No. 2,115,897. Charles E. Wooddell and Charles S. Nelson, Niagara Falls, N. Y., and Roy Lincoln, Buffalo, N. Y., to Carborundum Co., Niagara Falls, N. Y.

Patch adapted to patch textile materials; grooved textile sheet having on one surface a thin layer of grooved thermoplastic adhesive. No. 2,116,008. David Julian Block, Winnetka, Ill., to Abraham Appel, Chicago, Ill.

Production molded infusible synthetic resins; using aniline in process. No. 2,116,019. Alphonse Gams, Gustave Widmer, and Karl Frey, Basel, Switzerland, to Ciba Products Corp., Dover, Del.

Preparation synthetic resin composition; reacting para-cresol di-alcohol with di-para-cresylol ethane in presence of an acid catalyst. No. 2,116,024. Sydney Leonard Morgan Saunders, London, Eng.

Production a homogeneous, fusible resin in fatty oils; an oil-soluble phthalic acid, polybasic aliphatic resin. No. 2,116,125. Israel Rosenblum, New York City.

Insulating joint for electric cables, using thermoplastic substances as insulating materials. No. 2,116,266. Heinz Horn, Nordenham, Germany, to Norddeutsche Seekabelwerke A. G., Nordenham, Germany.

Production synthetic resins by polymerizing unsaturated cracked hydrocarbon vapors through the agency of granular adsorbent catalysts. No. 2,116,499. Julius Hyman, to Velsical Corp., both of Chicago, Ill.

Hardenable composition for forming printing plates; formed from cellulosic materials of different viscosity and an organic plasticizer. No. 2,116,536. Ralph H. McKee, Reno, Nev., to Cellu-Type Plate Co., Inc., Union City, N. J.

Manufacture mixed resins; reacting a polyvinyl ester, water, and an aldehyde with hydrolysis of the ester and condensation of the hydrolysis product with the aldehyde, then reacting on reaction product with a different aldehyde with further hydrolysis and with condensation of the hydrolysis product with the second aldehyde, reactions being carried out in presence of an acid reacting substance as catalyst. No. 2,116,635. Howard W. Matheson, Montreal, and George O. Morrison, Shawinigan Falls, Que., Canada, to Shawinigan Chemicals, Ltd., Montreal, Que., Canada.

Phonograph record made from a polymerized vinyl resin having a filler of diatomaceous earth incorporated therein. No. 2,116,986. Harold F. Stose, Haddonfield, N. J., to Radio Corp. of America, New York City.

Preparation laminated material, in which at least one metal sheet is joined to wood by means of an adhesive; applying priming coat to surface of metal, coat selected from the class of alkyd resins and primers of the oil type. No. 2,117,085. George R. Ensminger, New Brunswick, N. J., to du Pont, Wilmington, Del.

Production shaped articles of polymeric acrylic acid nitrile; treating latter product with a pyridinium compound in the warmth until dissolution occurs. No. 2,117,210. Herbert Rein, Leipzig, Germany, to I. G., Frankfort-on-Main, Germany.

Preparation resinous composition; esterifying the hydroxy group of castor oil with an acid from the group of natural resins, etc., and reacting with another acid. No. 2,117,255. Remmet Priester to Naamlooze Vennootschap Industrieele Maatschappij Voorheen Noury & Van Der Lande, both of Deventer, Netherlands.

Removal surplus synthetic resins of the phenol-formaldehyde A type from surfaces of wood, etc., which have been impregnated with same, using a solvent in treatment. No. 2,118,036. Philip C. P. Booty and Raymond G. Booty, Chicago, Ill.

Manufacture synthetic resins from amine-formaldehyde condensation products. No. 2,118,482. Theodor Sutter, Basel, Switzerland, to Ciba Products Corp., Dover, Del.

Rubber

Method forming rubber articles; using coating comprising a water-insoluble, finely divided material, in final step associating coated form with an aqueous dispersion of rubber. Nos. 2,115,560-1. Stewart R. Ogilby, West New Brighton, N. Y., to United States Rubber Co., New York City.

Method plasticizing rubber, using activated oxygen in process. No. 2,115,705. Warren F. Busse, Akron, O., to B. F. Goodrich Co., New York City.

Production deproteinized, non-coagulated rubber latices. No. 2,116,089. Leo Wallerstein, New York City.

Preservation rubber. No. 2,116,333. Ira Williams, Woodstown, and William A. Douglass, Penns Grove, N. J., and Arthur Morrill Neal, Wilmington, Del., to du Pont, Wilmington, Del.

Rubber vulcanization process; adding to rubber a vulcanizing agent and a furoyl derivative of a mercapto-aryl-thiazole having the thiol sulfur atom directly linked to a furoyl group. No. 2,116,978. Ludwig Meuser, Naugatuck, Conn., to United States Rubber Co., New York City.

Improved process thickening an aqueous dispersion of rubber, etc., using an organic destabilizing reagent in process. No. 2,117,258. Philip Schidrowitz and John William Malden, London, Eng., to Vultex Corp. of America, Cambridge, Mass.

Textile, Rayon

Method finishing fabrics; by treatment with a homogeneous water emulsion of bentonite and rubber latex. No. 2,115,154. William H. Alton, New York City, and Hilton Ira Jones, Wilmette, Ill., to R. T. Vanderbilt Co., New York City.

Production textiles having decorative effects, treating same with dyestuff having an affinity for the unpigmented yarn, whereby article is cross-dyed, unpigmented yarn being colored only by the dyestuff, and pigmented yarn being colored by the pigment. No. 2,115,329. Camille Dreyfus, New York City.

Production pattern effects on textiles containing a cellulose ester; saponifying cellulose ester and applying an esterified leuco vat dyestuff. No. 2,115,374. James Arthur Wainwright, and John Allan, Spondon, near Derby, Eng., to Celanese Corp. of America, corp. of Del.

Manufacture spun goods, and other textiles; first treating animal skins with swelling agents. No. 2,115,648. Roland Runkel, to Carl Freudenberg G.m.b.H., both of Weinheim, Germany.

Manufacture and treatment of artificial filaments, etc., of subdued lustre; first forming solution containing an organic derivative of cellulose and fine particles of an organic derivative of a saccharose. No. 2,116,062. Camille Dreyfus, New York City, and George Holland Ellis, Spondon, near Derby, Eng., to Celanese Corp. of America, corp. of Del.

Process reducing ester content and materials having a basis of organic esters of cellulose; impregnating materials with an aqueous medium containing a saponifying agent. No. 2,116,063. Henry Dreyfus, London, Eng.

Insertion of a high degree of twist in a textile yarn; using a non-drying oily substance to accomplish same. No. 2,116,064. Henry Dreyfus, London, and Robert Wighton Moncrieff, Spondon, near Derby, England, to Celanese Corp. of America, corp. of Del.

Method bleaching cotton and analogous textile fibers; first treating same with an intensely acting alkaline bleaching bath of an agent capable of splitting off oxygen containing caustic alkalies, finally subjecting bleached goods to second bleaching by chlorine. No. 2,116,332. Hugo Weiss, Augsburg, Germany.

Apparatus for manufacture artificial filaments, threads, etc. No. 2,116,548. William Whitehead and Canfield Hutson, Cumberland, Md., to Celanese Corp. of America, corp. of Del.

Apparatus for formation of artificial filaments, yarns, etc. No. 2,116,660. Canfield Hutson, Cumberland, Md., to Celanese Corp. of America, corp. of Del.

Water, Sewage Treatment

Water softening device. No. 2,117,091. Austin Gudmundsen to Gudmundsen-Stratton Labs., both of Milwaukee, Wis.

Method treating sewage by aeration. No. 2,118,266. Carl H. Nordell to Advance Engineering Co., both of Chicago, Ill.